Electrical World

JANUARY 13, 1940

36th

ANNUAL
STATISTICAL
NUMBER

27 ranges

...for measurements in signal, control and electronic circuits . . .

THE NEW WESTON Industrial CIRCUIT TESTER

(Model 785)

VOLTAGE RANGES

DC Volts—0-1/10/50/200/500/1000 volts—20,000 ohms per volt

AC Volts — 0-5/15/30/150/300/500 volts — 1000 ohms per volt

CURRENT RANGES

DC Current—0-50 microamperes, 1/10/100 milliamperes, 1 ampere and 10 amperes

AC Current — 0-.5/1/5/10 amperes (available through self-contained current transformer)

OHMMETER RANGES

0-3000, 0-30,000, 0-300,000 ohms

0-3 megohms, 0 to 30 megohms (self-contained batteries)

Compactness and light weight provide extreme portability. Sturdy oak carrying case measures only 13 x 12½ x 5½ in. Weight 13½ lbs.

The Model 785 Industrial Circuit Tester brings new convenience, new economy to production and maintenance testing. This compact, self-contained unit provides all the ranges necessary for voltage, current and resistance measurements wherever high sensitivity is a factor . . . including all types of signal systems, telephone circuits, photo-cell circuits, oscilloscope circuits, and for servicing network protectors, etc. . . . checking the electrical values in sensitive relays, cathode ray tubes, public address systems and amplifiers, thyratron tubes, etc. . . . as well as for many other plant production and maintenance requirements. Complete data on this new, relatively inexpensive test unit will gladly be sent on request. Weston Electrical Instrument Corp., 578 Frelinghuysen Avenue, Newark, N. J.

WESTON *Instruments*

A DECADE

TEN YEARS have elapsed since the market crashed in the fall of 1929, precipitating a long-drawn-out depression. In those years industries have had an opportunity to test their strength.

The statistics of the electric light and power industry that appear on the following pages indicate how well the utilities have met the challenge of depression, lower rates, restrictive legislation and competition. The figures show that in spite of all that has occurred in the past decade, which at the time seemed almost unbearable, the operating industry as a whole has suffered less materially than it has mentally.

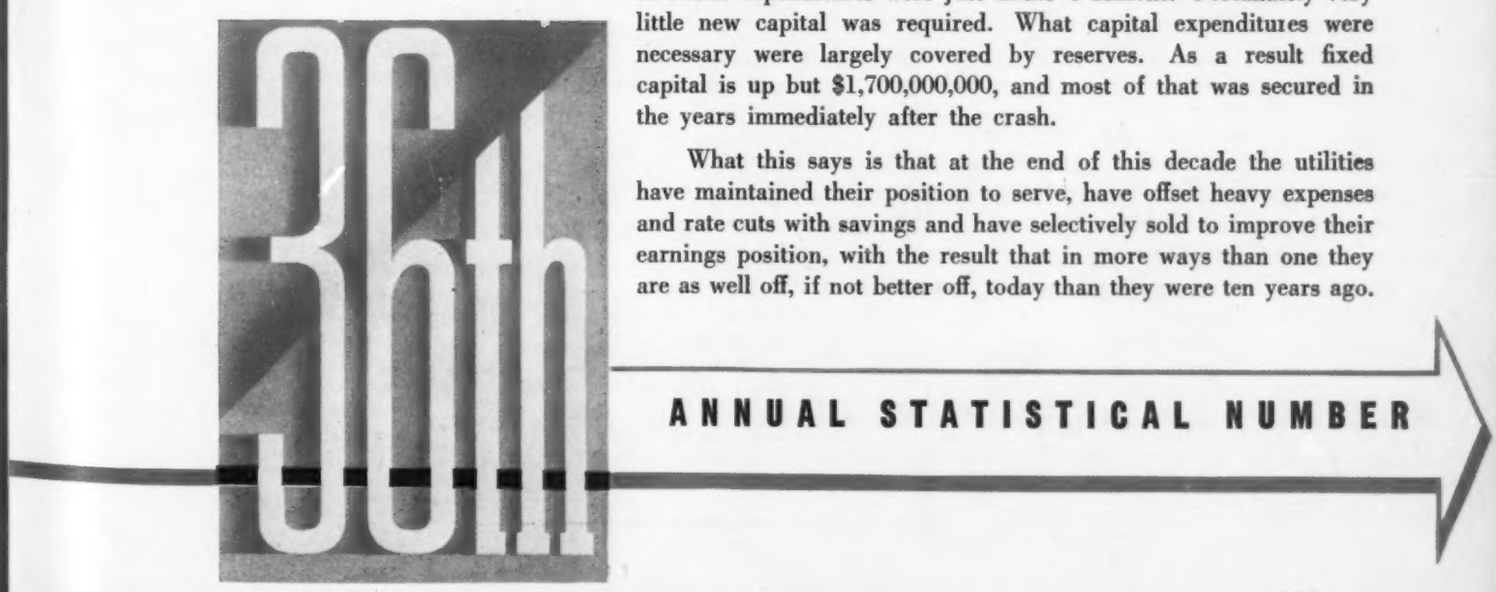
Rate decreases in the decade have saved the customers approximately a quarter of a billion dollars. This would have been serious were it not for the change in load balance. The old pattern of industrial 60, commercial 20 and residential 14 has given way to 50–25–25, thanks to the emphasis on residential and commercial load building. The results of this new pattern are some 214 million dollars more revenue at today's average rates than would have come in under the old 60–20–14 pattern. Thus rate decreases are offset by the new trend in load building.

In spite of general business conditions, the industry took on 4,600,000 new customers, showing that it is still far from static in the matter of new accounts.

One of the greatest burdens of the period was the swift rise in taxes. These, however, were offset by operating, engineering and management economies. Continued improvement in fuel consumption was sufficient to save during the ten years more than 200 millions. New ways of increasing the effective capacity of lines at modest expense reduced carrying charges. Refinancing at considerably lower interest charges brought very large savings.

Notwithstanding the need for economy, the service has not suffered, nor has the capacity been allowed to get down to the danger point. New construction expenditures were 3.9 billions during a period when output increased 33,000,000,000 kw.-hr. From 1924 to 1929, when output increased 36,000,000,000 kw.-hr., construction expenditures were just under 4 billions. Fortunately very little new capital was required. What capital expenditures were necessary were largely covered by reserves. As a result fixed capital is up but $1,700,000,000, and most of that was secured in the years immediately after the crash.

What this says is that at the end of this decade the utilities have maintained their position to serve, have offset heavy expenses and rate cuts with savings and have selectively sold to improve their earnings position, with the result that in more ways than one they are as well off, if not better off, today than they were ten years ago.



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Analysis of contents for the easy finding of specific figures and details of information. The reader is referred also to the table of "Outstanding Facts," which summarizes significant figures of the electric light and power industry for 1930 to 1939; it will be found on page 100

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HIGHLIGHTS

Here is a quick picture of the performance of the electrical industry in 1939, a recovery year with all business picking up and the electric utilities rising above or approaching previous highs in energy production and sales, in plans for new plant construction, in revenues and in number of customers served

OUTPUT: 123,000,000,000 Kw.-Hr.

Exceeded previous record year by 13 per cent. Drought curtails hydro generation (page 70).

CAPACITY: 37,500,000 Kw.

Drought throws extra load on steam but no service reduced. In ten years capacity up 26.8 per cent; output up 36.4 per cent (page 72).

NEW CAPACITY: 1,285,000 Kw.

Program for 1940 goes over 2,000,000 kw. first time in ten years. More transmission and substation construction next year (page 76).

ENERGY SALES: 107,000,000,000 Kw.-Hr.

Exceeds a hundred billion for first time. Up 13½ per cent over 1938, 7 per cent over previous high. Sharpest recovery yet. Industrial sales biggest factor. Residential and commercial neck and neck (page 82).

REVENUE: $2,304,000,000

Up 6 per cent. Residential average rate down to 4.05 cents. Commercial gain exceeds industrial. Farm up sharply. Revenue from residential incremental reverses trail and goes off (page 84).

CUSTOMERS: 28,750,000

Addition of 900,000 new customers makes 1939 one of record years. Race now between farms and residentials. Reclassification makes comparison difficult (page 86).

EXPENSES: $1,025,000,000

Operating ratio improved. Tax bill up to $345,000,000, but down in ratio to gross. Depreciation and retirement up (page 90).

FINANCING: $992,000,000

Only 16 millions in new money. Larger programs looked for in 1940. Institutional investors took over a quarter of offerings (page 92).

BUDGETS: $605,000,000

Up a third. Largest in ten years. Increases in all divisions. Emphasis on steam generating plant. Transmission again active (page 94).

ELECTRICAL MANUFACTURING: $2,143,000,000

Production up 25 per cent. 1940 may exceed 1929 (page 96).

REA: 400,000 Consumers

Allotments since start of 267 millions to 687 systems; energized 488. Miles of line built, 180,000. Costs reduced to $754 per mile (page 99).

OUTPUT

Banner year steps out with 13 per cent outstripping gain — Southern areas reflect large generation increase — Drought nicks hydro record

ANY ONE inclined to let a single quantity be his index of the well-being and pace of the power business need have no hesitancy in setting down 1939 as the banner year so far. On the slightest improvement in national economic confidence the kilowatt-hours invariably step forward faster. The year just past was therefore just another persuasive proof that electrical saturation is neither on or even at a plateau, irrespective of general business or population.

As early as August of 1939 the weekly output of kilowatt-hours had already exceeded the Christmas week of 1938, and that week had then been the highest yet. Further, the remaining weeks of 1939 showed generation not only consistently in excess of corresponding weeks of any previous year but also at a rate of increase over 1938 steeper than for any of the last four years. Add to that the fact that there was much less dip from January to June and there results the basis for the cold statistical fact that total 1939 output was by more than 13 per cent the largest in the history of the industry.

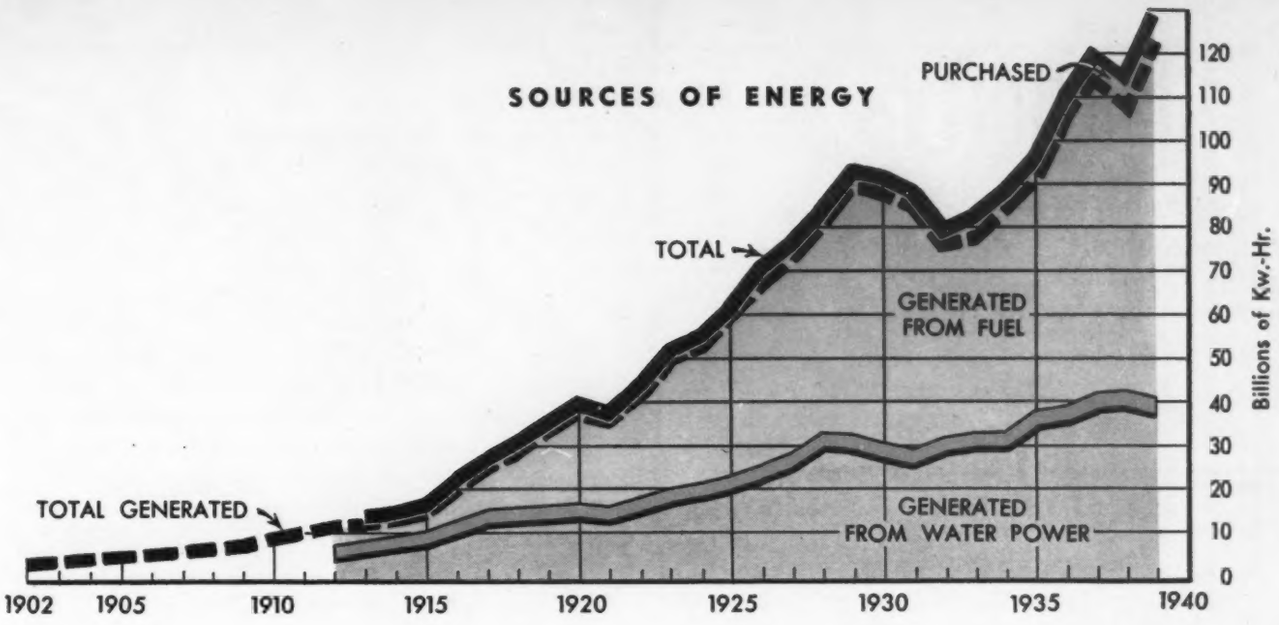
All the apologies for the appreciable sawtooth shrinkage from 1937 output that took place in 1938 consequently melt away before a 1939 resumption of stride that not only restores the lost 6 billions of kilowatt-hours but adds 8 billions more for enthusiastic good measure. As with every earlier "sawtooth," the 1938 dip has turned out to prove the capacity for an electrical rebound with better than 100 per cent resiliency. As a result of all this response the output of utility and municipal plants of the grand and glorious year 1929 has now been outstripped by a good 36 per cent.

Together the private and municipal utilities generated the 123 billion kilowatt-hours shown in the adjoining tabulation. However, their total handling of energy for delivery to ultimate users was augmented by an additional 5,320,000,000 kw.-hr., some of which came across from Canada (1,270,000,000) and some from the government hydro projects and from such industries as the paper and electrochemical. The industry continues, therefore, to derive from supplementary sources whatever energy is economically obtainable by agreement with large-scale industrial generation or the federal projects.

Drought made the year a relatively poor one for hydro generation. Despite the increase in hydro capacity on utility and municipal systems the hydro plants turned out 1¼ billion less kilowatt-hours than in 1938. As a result the fuel-burning plants had to make up that deficiency as well as provide practically the whole of the absolute increase of 15 billion kilowatt-hours generated. Increased importation made up only 400,000,000 kw.-hr. of the enlarged demands upon the industry. Lower down on many of the same lean streams are steam plants which rely on the flow for condensing purposes. In quite a few instances the output and economy suffered somewhat from insufficiency of condensing supply and this threw some of the demand for energy to steam plants more favorably situated.

Regionally the East South Central states made the best output showing, the industry there being called on for 21 per cent more kilowatt-hours than in 1938. The East North Central and South Atlantic states both experienced a 15 per cent increase. New England was fourth with 14 per cent. Middle Atlantic and Pacific Coast areas turned out 11 per cent more. West South Central and Mountain districts generated 8½ and 7½ per cent more respectively, and last in the list was the West North Central region with a modest 4 per cent increase. The improvement in output, therefore, was reasonably well distributed over the nation.

Readers who wish to record for themselves the output from week to week during the current year will find useful the chart of output from 1902 which is included as a supplement to this issue.



SOURCE AND DISPOSAL OF ENERGY (Millions of Kw.-Hr.)

Year	Generated by			Total Generated	Net Purchased	Total Net Input	Total Company Use	Losses and Energy not Accounted for	Sales to Ultimate Consumers
	Fuels	Water Power	Internal Combustion						
1926	44,145.9	23,843.8	†	67,989.7	2,486.3	70,476.0	2,552.5	11,834.2	56,089.3
1927	46,862.5	26,381.9	†	73,244.4	3,124.7	76,369.1	2,458.6	12,659.3	61,251.2
1928	49,446.5	31,006.9	†	80,453.4	2,940.7	83,394.1	2,564.3	13,841.8	66,988.0
1929	59,128.1	30,956.3	†	90,084.4	2,672.7	92,757.1	2,480.0	14,982.6	75,294.5
1930	59,387.0	29,204.7	†	88,591.7	3,365.1	91,956.8	2,489.7	14,561.0	74,906.1
1931	58,037.7	27,537.6	†	85,575.3	2,825.2	88,400.5	2,336.5	14,162.1	71,901.9
1932	45,204.5	30,800.7	708.9	76,714.1	2,978.2	79,692.3	2,117.9	13,863.6	63,710.8
1933	46,871.1	31,356.5	705.4	78,933.0	3,478.0	82,411.0	1,972.5	14,522.8	65,915.7
1934	53,106.3	31,069.1	810.4	84,985.8	3,367.3	88,353.1	2,153.1	15,118.4	71,081.6
1935	55,197.4	36,543.6	870.4	92,611.4	3,252.4	95,863.8	2,168.3	16,099.5	77,596.0
1936	68,423.0	37,230.6	912.7	106,566.3	3,119.0	109,685.3	2,276.2	17,364.8	90,044.3
1937	74,206.3	40,959.3	†	115,165.6	4,644.7‡	119,810.3	2,322.9	18,041.1	99,446.3
1938	68,765.5	40,925.6	†	109,691.1	4,956.4	114,647.5	2,196.1	18,161.2	94,290.2
1939*	83,600.0	39,400.0	†	123,000.0	5,320.0	128,320.0	2,120.0	19,200.0	107,000.0

* Ten months actual, two months estimated.

‡ Large part of increase due to energy received from Boulder Dam.

† Included with steam generation.

Source, Edison Electric Institute.

ENERGY GENERATED

Electric Light and Power Industry

(Millions of Kilowatt Hours)

Region	1936	1937	1938	1939
N. E...	6,989	7,436	6,926	7,790
M. A...	26,540	28,608	27,360	30,350
E. N. C.	26,021	28,175	25,996	30,040
W. N. C.	6,816	7,520	7,310	7,620
S. A...	12,477	13,683	12,601	14,330
E. S. C.	4,549	5,083	5,689	6,390
W. S. C.	5,343	6,358	6,363	7,080
M'tain.	4,009	4,305	4,180	6,440
Pacific.	13,822	13,998	13,266	12,960
U. S....	**106,566**	**115,166**	**109,691**	**123,000**

Source: Edison Electric Institute.

1939 ENERGY OUTPUT COMPARED WITH PREVIOUS HIGH YEAR

CAPACITY

No curtailment of service despite a rapid output increase — Drought a factor in tax on capacity — Systems reinforced for reliability

PROBABLY no year since the war presented the potentiality for strain on the generating capacity of the electric light and power industry as did the year 1939. It was a year of reasonable growth as a whole, but the greater part of that growth was packed in the last four or five months. Simultaneously with this sudden spurt in demand occurred one of the worst droughts the eastern section of the country ever experienced. Not only was an extra load thrown upon steam generation but, further to aggravate the situation, low stream flows and shrunken condensing supplies made efficient and economical operation difficult.

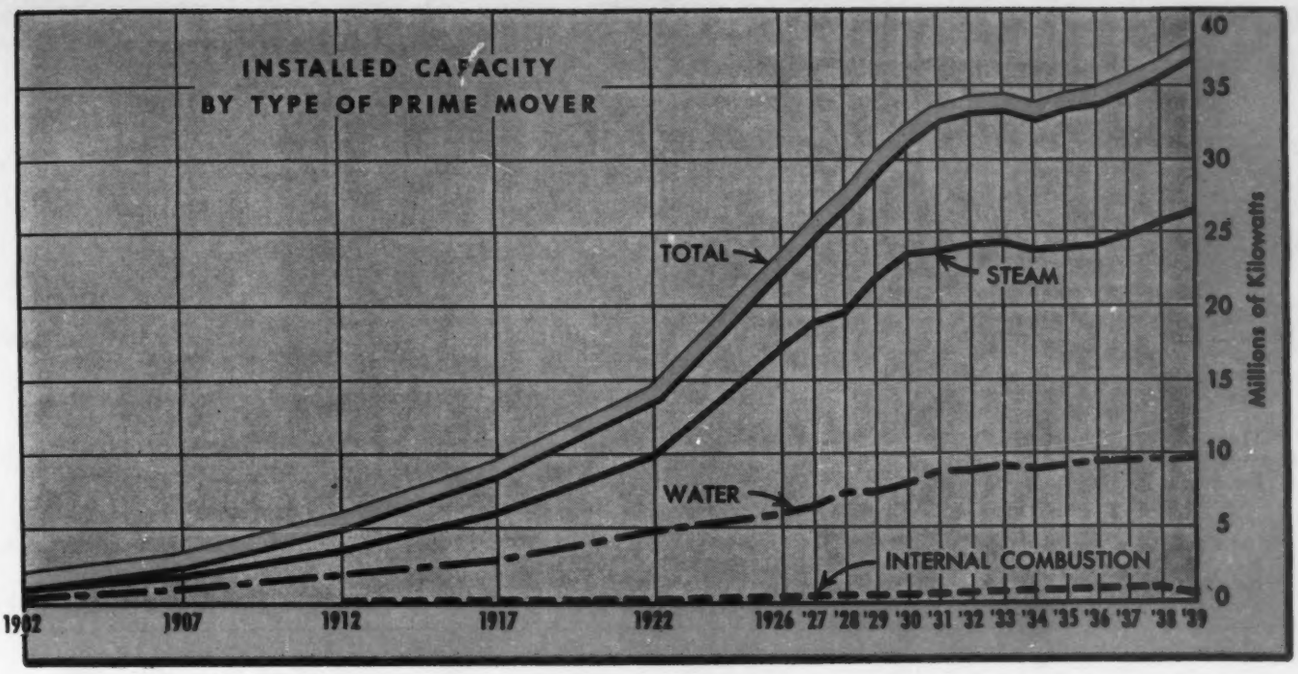
Despite this fortuitous combination of augmented loads and restricted capacity there was no curtailment of supply to the homes and businesses of the country. Interconnections and reserves were ample to carry the requirements without reported distress during the pre-Christmas week, which almost invariably has been the top week of every year.

In the last ten years the generated output has stepped up 36.4 per cent and meanwhile the gain in capacity has been 26.8 per cent. Admittedly this is as great a lag as has existed previously, but there are several reasons why the trend should logically and safely show a lesser addition to capacity than occurs in output. In the first place the significant relationship lies between peak and capacity and not between output and capacity. It is conceivable, for instance, that load factors might improve to the degree that it would be possible to generate nearly twice the present output with the present capacity and yet run no risk of insufficiency of supply. In short, there is evidence in substantiation of the assertion that peaks have not kept step with output, at least during the three or four years preceding 1939; nor is there any reason to believe that 1939 did not also show less increment in peak than in output.

Lag of peak behind output is the natural consequence of several factors. Shortened work days and work weeks are having positive effect in preventing the overlap of daytime industrial load upon evening commercial and home load. During the week preceding Christmas sudden dark hours in the afternoon (atop the "shopping" load) created the largest daily output in a large Eastern company's history, but it did not, however, create as great a sustained peak as had previously been experienced. Added to this is the conscious effort of the power companies to build load selectively—the kind that is profitable partly because it results in enlarged revenue per kilowatt-hour but more so because it avoids doing much to the distribution and generation peak.

Nor does this tell the whole story, because there have been positive efforts in the industry to improve the reliability and availability of generation as well as the other functions interposed between the service and the user. Manufacturers are constantly improving their products. Pioneering advances are not occurring so fast that reliability incurs a setback but, rather, profits by the lessons of the past. Utilities have continued during the year their programs of eliminating bottlenecks and weak links, they have reinforced the technique for clearing faults from the systems, the esprit de corps of the operating forces has been strengthened and, finally, the carrying capacity of all elements of the system has been studied for ways to augment it safely.

That is the national picture as it stood with the net addition during the year of just over a

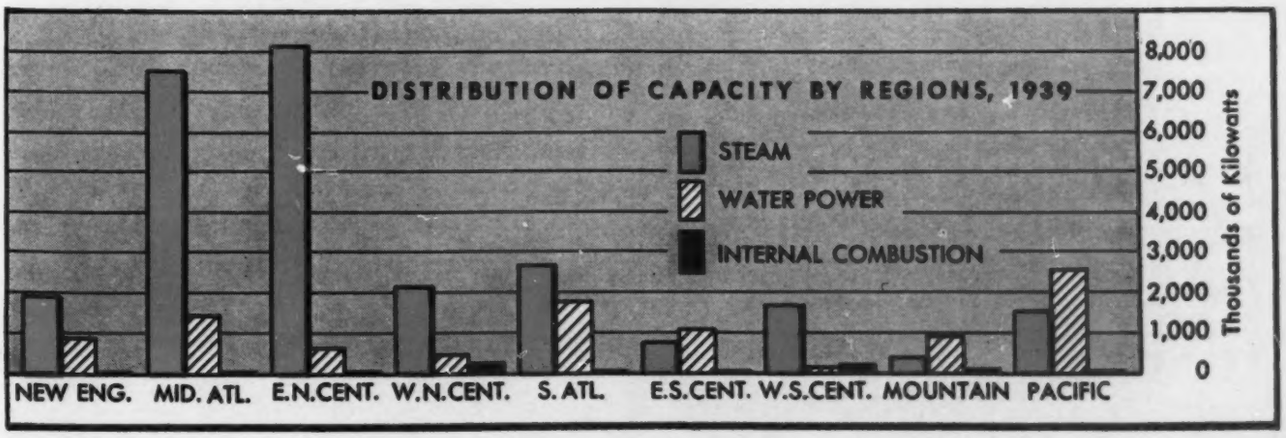


GENERATOR RATING by Regions and by Type of Prime Mover

Edison Electric Institute (Thousands of Kilowatts)

Region	1929				1935				1936			
	Steam	Water Power	Int. Comb.	Total	Steam	Water Power	Int. Comb.	Total	Steam	Water Power	Int. Comb.	Total
United States...	21,744	7,438	376	29,558	23,921	9,219	608	33,749	24,107	9,539	614	34,260
New England....	1,724	582	6	2,312	1,759	800	9	2,568	1,768	808	10	2,586
Mid. Atlantic....	5,747	1,141	20	6,908	6,916	1,501	27	8,444	6,963	1,516	29	8,508
E. No. Central..	6,848	537	23	7,438	7,116	609	50	7,775	7,187	623	43	7,853
W. No. Central..	1,663	302	111	2,076	1,892	470	203	2,565	1,976	462	212	2,650
So. Atlantic.....	2,184	1,299	37	3,520	2,238	1,677	60	3,975	2,270	1,702	56	4,028
E. So. Central...	691	634	25	1,350	720	844	27	1,591	710	1,004	27	1,741
W. So. Central...	1,289	19	114	1,422	1,484	100	143	1,727	1,453	101	147	1,701
Mountain.....	279	732	32	1,043	327	744	55	1,126	345	765	51	1,161
Pacific.....	1,289	2,192	8	3,489	1,469	2,474	34	3,977	1,435	2,558	39	4,032

	1937				1938				1939 Est.			
United States...	24,638	9,634	688	34,960	25,900	9,664	767	36,330	26,732	9,935	799	37,466
New England....	1,828	836	13	2,677	1,828	822	12	2,662	1,876	829	13	2,718
Mid. Atlantic....	6,987	1,480	34	8,501	7,426	1,466	34	8,926	7,523	1,462	34	9,019
E. No. Central...	7,330	627	55	8,012	7,865	653	64	8,582	8,186	655	67	8,908
W. No. Central..	2,052	436	230	2,718	2,141	450	267	2,857	2,195	450	281	2,926
So. Atlantic.....	2,429	1,731	66	4,226	2,481	1,714	65	4,260	2,655	1,789	66	4,510
E. So. Central...	713	1,011	28	1,752	739	1,093	26	1,859	739	1,118	26	1,883
W. So. Central...	1,501	101	155	1,757	1,600	102	171	1,873	1,691	102	181	1,974
Mountain.....	371	783	62	1,216	401	830	83	1,314	408	997	86	1,491
Pacific.....	1,427	2,630	44	4,101	1,419	2,534	45	3,997	1,459	2,533	45	4,037



GENERATOR RATING—Public Utility Power Plants

Central Station, Municipal, Railway and Other

Preliminary, as of October 1, 1939 — Courtesy of Federal Power Commission

Division and State	No. of Companies[1]	No. of Plants[2]	Total Capacity Kw.	Generator Capacity of Plants Operated by: One Type of Prime Mover — Water Power No.	Water Power Cap.	Steam Power No.	Steam Power Cap.	Internal Comb. Engines No.	Internal Comb. Engines Cap.	Combination of Two or More Types — Total No.	Total Cap.	Water Power Cap.	Steam Power Cap.	Int. Comb. Engines Cap.
United States	1,760	3,879	40,203,969	1,412	11,134,156	1,189	27,553,710	1,047	693,812	231	822,291	219,769	486,166	116,356
New England	143	332	3,032,516	227	831,544	69	2,072,870	9	9,363	27	118,739	19,011	96,315	3,413
Maine	24	76	246,242	61	187,838	7	54,730	3	872	5	2,802	1,290	800	712
New Hampshire	15	57	317,656	44	231,744	5	61,585	1	780	7	23,547	3,485	19,675	387
Vermont	24	71	179,382	61	165,522	3	9,800	0	0	7	4,060	1,460	2,400	200
Massachusetts	55	79	1,373,960	34	152,525	35	1,144,015	3	6,390	7	71,030	11,976	56,940	2,114
Rhode Island	6	11	238,321	5	3,350	5	234,750	1	221	0	0	0	0	0
Connecticut	19	38	676,955	22	90,565	14	567,990	1	1,100	1	17,300	800	16,500	0
Middle Atlantic	138	401	9,748,103	219	1,450,952	145	8,107,655	21	29,828	16	159,668	120,420	34,850	4,398
New York	69	248	5,566,964	181	1,166,287	51	4,372,278	7	18,901	9	9,498	3,400	2,550	3,548
New Jersey	16	27	1,132,817	4	3,320	17	1,119,450	4	2,717	2	7,330	3,680	3,500	150
Pennsylvania	53	126	3,048,322	34	281,345	77	2,615,927	10	8,210	5	142,840	113,340	28,800	700
East North Cent	325	664	9,084,280	274	698,300	283	8,154,618	72	55,552	35	175,810	13,601	146,164	16,045
Ohio	72	112	2,450,583	8	12,150	89	2,427,536	14	8,297	1	2,600	600	2,000	0
Indiana	58	97	1,245,267	21	35,320	60	1,197,683	15	11,989	1	275	0	60	215
Illinois	66	95	2,504,187	10	46,527	65	2,344,276	14	9,766	6	103,618	3,913	96,545	3,160
Michigan	63	182	1,890,999	121	342,377	34	1,518,185	16	14,524	11	15,913	2,670	4,734	8,509
Wisconsin	66	178	993,244	114	261,926	35	666,938	13	10,976	16	53,404	6,418	42,825	4,161
West North Cent	463	814	3,125,111	116	520,322	228	2,236,933	414	249,821	56	118,035	11,403	74,714	31,918
Minnesota	71	137	674,777	41	154,896	48	486,275	35	18,592	13	15,014	2,328	5,282	7,404
Iowa	98	175	687,055	27	123,084	55	442,462	81	54,749	12	66,760	3,695	55,120	7,945
Missouri	65	105	765,119	7	150,545	35	567,690	60	44,726	3	2,158	0	838	1,320
North Dakota	15	36	80,072	0	0	16	72,020	19	6,828	1	1,224	0	500	724
South Dakota	36	60	78,003	6	4,260	9	44,147	42	25,748	3	3,848	0	842	3,006
Nebraska	93	164	351,735	28	81,151	33	216,839	87	38,511	16	15,234	4,570	2,923	7,741
Kansas	85	137	488,350	7	6,386	32	407,500	90	60,667	8	13,797	810	9,209	3,778
South Atlantic	172	412	4,825,515	149	2,021,416	136	2,602,000	100	61,974	27	140,125	39,100	90,372	10,653
Delaware	7	8	36,875	0	0	4	33,200	4	3,675	0	0	0	0	0
Maryland	13	27	637,644	3	271,385	11	358,212	11	5,157	2	2,890	0	770	2,120
Dist. of Columbia	2	3	257,400	1	2,400	2	255,000	0	0	0	0	0	0	0
Virginia	30	71	575,734	31	166,276	19	309,565	13	8,160	8	91,733	15,545	73,750	2,438
West Virginia	16	39	733,278	10	100,880	18	627,510	8	4,327	3	561	100	90	371
North Carolina	35	85	1,055,116	52	651,180	22	395,775	8	6,447	3	1,714	905	0	809
South Carolina	15	39	633,943	23	488,060	8	125,130	6	3,163	2	17,590	12,300	5,200	90
Georgia	19	58	481,164	26	327,042	24	136,726	4	1,124	4	16,272	10,050	5,312	910
Florida	35	82	414,361	3	14,193	28	360,882	46	29,921	5	9,365	200	5,250	3,915
East South Cent	85	200	1,978,045	36	1,196,117	87	753,682	68	23,941	9	4,305	290	2,595	1,420
Kentucky	21	40	363,061	3	110,860	25	247,953	7	2,473	5	1,775	290	815	670
Tennessee	26	57	594,605	20	390,427	23	199,410	11	2,938	3	1,830	0	1,480	350
Alabama	15	43	957,762	13	694,830	19	258,320	11	4,612	0	0	0	0	0
Mississippi	23	60	62,617	0	0	20	47,999	39	13,918	1	700	0	300	400
West South Cent	181	407	2,031,780	28	138,773	110	1,696,590	254	156,304	15	40,113	649	26,466	12,998
Arkansas	27	51	158,635	5	67,008	22	79,588	23	11,394	1	645	0	250	395
Louisiana	35	60	407,458	0	0	12	377,646	46	27,887	2	1,925	0	937	988
Oklahoma	57	101	363,940	2	1,200	25	315,643	68	42,186	6	4,911	419	1,157	3,335
Texas	62	195	1,101,747	21	70,565	51	923,713	117	74,837	6	32,632	230	24,122	8,280
Mountain	161	352	2,125,519	152	1,537,532	76	474,220	87	59,642	37	54,125	10,345	13,290	30,490
Montana	13	32	330,826	18	321,210	4	5,265	7	1,719	3	2,632	180	1,476	976
Idaho	17	47	260,148	39	255,066	2	600	3	1,612	3	2,870	2,210	0	660
Wyoming	24	39	52,275	8	15,182	17	31,134	9	3,515	5	2,444	1,530	372	542
Colorado	37	77	288,155	21	62,727	31	213,616	17	8,631	8	3,181	1,460	575	1,146
New Mexico	18	38	104,242	1	80	12	86,045	22	13,301	3	4,816	760	1,150	2,906
Arizona	21	45	420,711	12	292,050	8	77,810	20	25,618	5	25,233	0	7,217	18,016
Utah	23	61	160,155	46	87,867	2	59,750	5	2,945	8	9,593	3,805	0	5,788
Nevada	8	13	509,007	7	503,350	0	0	4	2,301	2	3,356	400	2,500	456
Pacific	92	297	4,253,100	211	2,739,200	55	1,455,142	22	47,387	9	11,371	4,950	1,400	5,021
Washington	30	70	1,013,646	50	794,335	13	214,520	4	1,055	3	3,736	2,140	1,100	496
Oregon	29	71	445,879	45	263,076	16	174,300	6	2,533	4	5,970	2,030	300	3,640
California	33	156	2,793,575	116	1,681,789	26	1,066,322	12	43,799	2	1,665	780	0	885

[1] Only companies and municipalities that have generating plants. Excludes those purchasing all of their energy. Total includes 94 duplications because of companies operating in more than one state. [2] Includes all plants generating energy for public use having a capacity of 100 kilowatts or more.

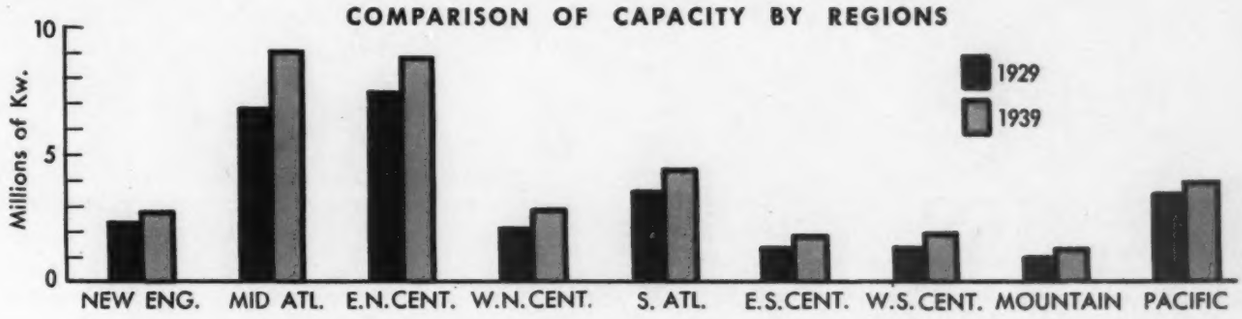
GENERATING FACILITIES
By Type of Prime Mover (Kw.)
Electric Light and Power Industry

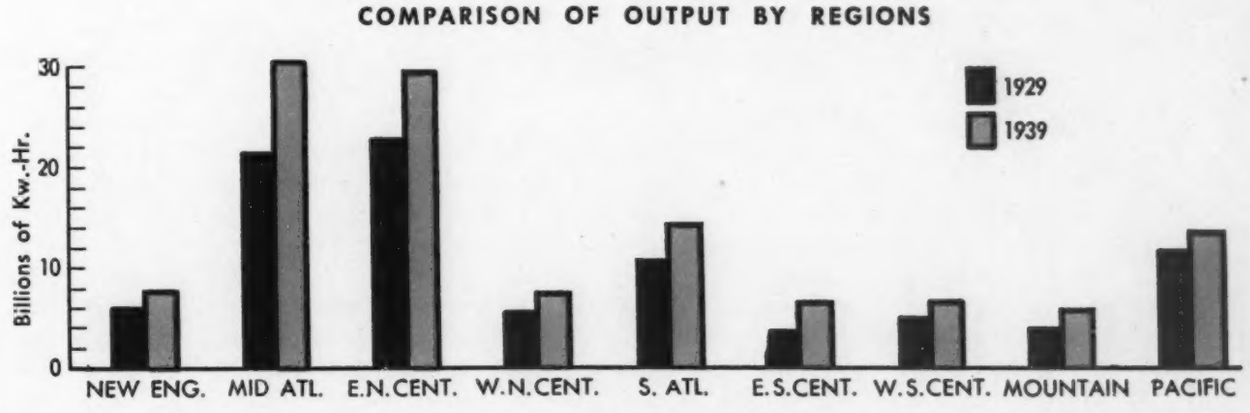
Year	Steam	Water Power	Internal Combustion	Total
1926	17,031,712	6,095,556	†	23,127,268
1927	18,723,783	6,554,321	†	25,278,104
1928	19,645,799	7,278,989	295,875	27,220,663
1929	21,743,602	7,438,882	376,153	29,558,637
1930	23,427,058	8,206,732	416,129	31,889,919
1931	23,823,017	8,806,096	447,793	33,076,906
1932	24,358,777	8,922,969	582,326	33,864,072
1933	24,165,698	8,974,887	593,035	33,733,620
1934	23,780,148	9,140,690	603,633	33,524,471
1935	23,989,227	9,288,537	610,541	33,888,305
1936	24,106,618	9,538,640	614,813	34,260,071
1937	24,637,926	9,634,014	688,381	34,960,321
1938	25,899,534	9,663,929	766,917	36,330,380
1939*	26,731,400	9,934,900	799,900	37,466,200

Source: E. E. I. * Preliminary estimate. † Included with steam.

million new kilowatts—1,135,820 to be exact. Of that amount, 984,700 kw. was steam-generating capacity, only 271,000 was hydro and practically 33,000 kw. was in internal combustion engine drives for generation. The latter is slowly increasing, although it still amounts to only 2.15 per cent of the total. It is, of course, largely in municipal plants of small total capacity.

Regionally there were two areas of primary interest. The Southern states in the 1929-39 decade experienced a 51 per cent increase in output and by the end of 1939 had augmented their generating capacity to the extent of 32.8 per cent.





Meanwhile the industrial eastern quarter of the nation had had a growth of 35 per cent in output and to meet it has put in 24 per cent additional capacity. The Mountain mining area more than matched a 41.5 per cent increase in output by 43.1 per cent more capacity. And the Pacific coast kept step with 15.5 and 15.7 respectively. Reference to the new capacity commitments (elsewhere) for 1940-41 naturally shows most of the new generators to be planned for the East and South.

COMPARISON OF CAPACITY AND OUTPUT
by Regions, 1929 and 1939

	Capacity (1,000 Kw.)		Incr. Per Cent	Output (1,000,000 Kw.-Hr.)		Incr. Per Cent
	1929	1939		1929	1939	
New England	2,286	2,718	18.9	5,857	7,790	33.0
Middle Atlantic	6,934	9,019	30.0	21,746	30,350	39.5
East North Central	7,438	8,908	19.8	22,847	30,040	31.5
West North Central	2,076	2,926	40.7	5,387	7,620	41.4
South Atlantic	3,520	4,510	28.1	10,379	14,330	38.1
East South Central	1,350	1,883	39.0	3,397	6,390	88.2
West South Central	1,422	1,973	38.7	4,888	7,080	44.8
Mountain	1,043	1,492	43.1	3,785	6,440	70.2
Pacific	3,489	4,037	15.7	11,798	12,960	9.9
United States	**29,558**	**37,466**	**26.8**	**90,084**	**123,000**	**36.4**

Source, 1929, E.E.I. Stat. Bull. No. 4; 1939, Est. based on ten months' operations.

NEW CAPACITY

Total for year 1,284,830 kw.—1940 to go over two million for first time in ten years—More activity in transmission and substation additions

THE precision with which capacity follows load was never more clearly evident than during this recent period of short business cycles. In 1936 output improved substantially and in 1937 it was reflected in added capacity. In early 1937 there was a continued upward swing in output and the next year new capacity hit an eight-year high in spite of the fact that 1938 output was down. This latter condition didn't register until last year, when new capacity naturally was less than in the preceding year.

But the last half of 1939 went on a generating spree with a very rapid rise in output. And so 1940 will see the largest addition to generating capacity since 1930. In fact, it will be the first time in ten years that it has exceeded 2,000,000 kw. Because the growth came so late in the year considerable new capacity is scheduled for 1941.

With a continued increase in load during the first half of the new year it is possible that 1941 new steam capacity may come close to hitting a new high level. What hydro will do is unknown because the federal government has not yet definitely declared its 1941 installation program. Internal combustion will add some more, but not enough to affect the total to any extent.

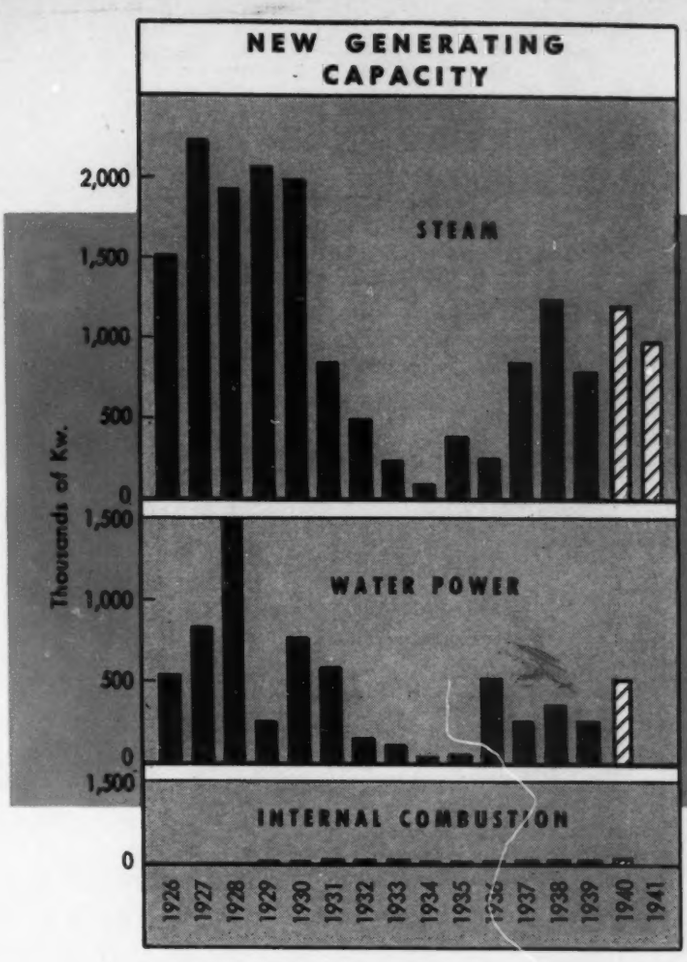
The year-by-year additions of both hydro and steam show up somewhat erratically when compared with the load increases of each year. Hydro has been growing again now that the federal projects are unfolding. Meanwhile the private utilities add little hydro, but rather concentrate on steam-generation additions. Further, the steam-power increments for private utility systems go primarily into areas where there is no large-scale hydro obtainable by negotiation with the government projects. Several such negotiations have been consummated. In such areas it can be expected that steam plant facilities will mark time so long as dependable public hydro is available.

Such a situation exists to a considerable degree on the Pacific Coast, where new steam plants have been added largely because certain power customers also have large steam process requirements. In the Northwest the erection of new power plants will for some time be dependent upon the disposition of Columbia River power.

Another significant fact is that recent additions are nearly all net gains, inasmuch as only a modest amount of capacity has been discarded because it was superannuated and uneconomical. Superposition of high-pressure units has salvaged structures and older low-pressure generation which regulatory authorities occasionally were disposed to rate as dead or moribund. The sharp rise of recent loads confirmed them as active assets, but they will not last forever.

The year just past and the year ahead show up somewhat better than both 1937 and 1938 as to transmission line construction and erection of substations. Increased loadings and greater generating capacity quite logically require increase in transmission facilities. To a considerable extent the expedients which rendered single lines as capable as duplicate lines have been absorbed, and thus building of new links at new points has had to resume. In particular, 1940 looks already to be nearly 30 per cent greater than either 1937, 1938 or 1939 transmission expenditures. They are to be well distributed over the country.

A similar figure of 30 per cent represents the enlarged activity in substation construction efforts to eliminate bottlenecks and better handle the needs of distribution supply. New England, Middle Atlantic and East South Central States are to get the biggest additions for the same load reasons that they are to have the largest increments of generation.



NEW CAPACITY ADDED EACH YEAR

as reported to Electrical World for the entire industry

Year	Kilowatts			Total
	Steam	Water	Int. Comb.	
1927	*2,240,000	†818,000	(e)	3,058,000
1928	1,935,500	†1,520,000	(e)	3,455,500
1929	2,075,285	‡249,200	5,800	2,329,485
1930	2,034,527	748,480	6,420	2,789,437
1931	821,100	566,500	15,400	1,403,000
1932	457,750	126,155	8,550	592,455
1933	215,775	95,325	35,250	346,350
1934	47,000	41,900	5,805	94,705
1935	345,325	38,950	1,815	386,090
1936	211,900	‡489,865	19,328	721,093
1937	851,100	245,346	22,314	1,118,760
1938	1,327,239	345,605	23,064	1,695,908
1939	906,700	370,150	7,980	1,284,830
1940§	1,383,250	607,900	19,940	2,011,090
1941§	995,000	b.....	1,600	b956,600

* Kw. estimated, based on kva. reported.
† Kw. estimated; reported wholly or partly in hp.
‡ Incl. Boulder 165,000, Norris 100,000. § Prospective.
e Included with steam. b No report on Federal projects.

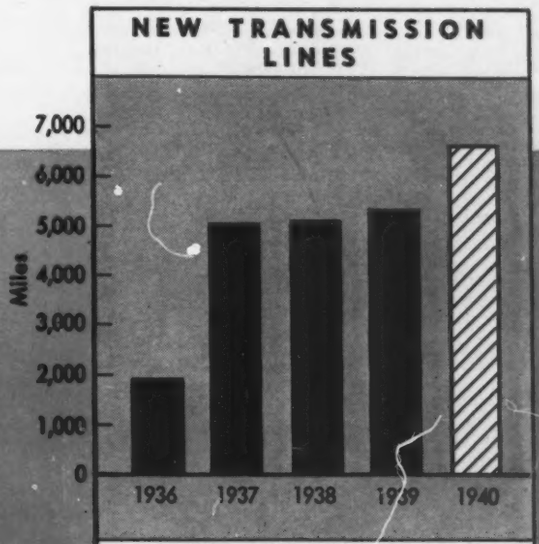
CONSTRUCTION OF TRANSMISSION LINES (Miles)

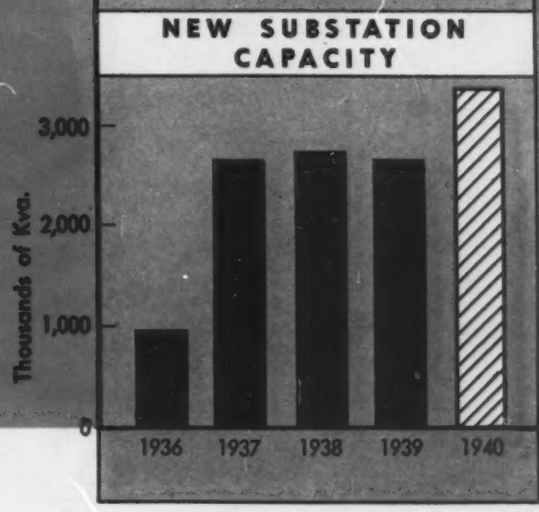
Region	1936	1937	1938	1939	1940 (Est.)
New England	69	127	99	169	297
Middle Atlantic	85	279	361	680	850
East North Central	220	785	882	940	1,240
West North Central	238	553	295	340	440
South Atlantic	455	798	617	740	940
East South Central	90	428	810	535	615
West South Central	149	615	674	720	865
Mountain	214	750	305	840	600
Pacific	319	802	1,113	415	770
United States	1,839	5,137	5,156	5,379	6,617

CONSTRUCTION OF SUBSTATIONS (Thous. Kva.)

Region	1936	1937	1938	1939	1940 (Est.)
New England	94	146	123	225	277
Middle Atlantic	138	511	347	269	507
East North Central	222	597	649	612	780
West North Central	129	322	199	280	244
South Atlantic	179	440	368	385	436
East South Central	43	88	430	387	410
West South Central	36	191	105	60	210
Mountain	64	124	106	77	137
Pacific	21	193	422	323	374
United States	926	2,612	2,749	2,618	3,369

Source, "Electrical World" Surveys.





GENERATING CAPACITY ADDED IN 1939

Steam

Private Companies	*Kw.*
Albuquerque Gas & Electric	2,500
Boston Edison	30,000
Central Illinois Light	25,000
Central Ohio Light & Power	5,000
Columbus & Southern Ohio Elec	30,000
Community Public Service	5,000
Consumers Power	*70,000
Detroit Edison	60,000
Empire District Electric	5,000
Gulf States Utilities	33,000
Houston Lighting & Power	25,000
Kansas Electric Power	10,000
Kansas Utilities	1,000
Montana-Dakota Utilities	750
Northern States Power	35,000
Northern States Power	5,000
Northern States Power	10,000
Ohio Edison	35,000
Ohio Edison	20,000
Ohio Power	60,000
Otter Tail Power	10,000
Pacific Gas & Electric	*50,000
Pennsylvania Electric	20,000
Pennsylvania Electric	35,000
Pennsylvania Power	*35,000
Public Service of Colorado	3,000
Public Service of New Hampshire	20,000
Rockland Light & Power	6,750
Rockport Water Works	750
St. Joseph Rwy. Light, Heat & Power	7,500
Sioux City Gas & Electric	1,500
Southern Indiana Gas & Electric	20,000
Southwestern Gas & Electric	15,000
Southwestern Electric	7,500
Virginia Public Service	15,000
Wellsboro Electric	1,500
West Penn Power	60,000
Wisconsin Elec. Power	13,700
Total	789,450

Municipal and Other Public Plants	
Jonesboro & Nettleton, Ark	3,000
Lamar, Colo.	2,500
Norwich, Conn.	7,500
Lakeland, Fla.	*5,000
Springfield, Ill.	15,000
Crawfordsville, Ind.	5,000
Rushville, Ind.	2,000
Ames, Iowa	3,000
Atlantic, Iowa	1,500
Hagerstown, Md.	5,000
Lansing, Mich.	*31,500
Austin, Minn.	5,000
Chillicothe, Mo.	2,500
Columbus, Mo.	5,000
Greenville, N. C.	5,000
Rocky Mount, N. C.	7,500
Washington, N. C.	*4,250
Galion, Ohio	3,000
Piqua, Ohio	4,000
Total	117,250

Hydro

Private Companies	*Kw.*
Appalachian Electric Power	*80,000
Bangor (Me.) Hydro-Electric	*2,500
Central Maine Power	7,000
Potomac Edison	1,000
Pacific Gas & Electric	2,000
Public Electric Light	3,750
Public Service of Colorado	200
Salt River Valley Water Users' Assn.	3,000
Southern California Edison	165,000
Wisconsin Power & Light	2,000
Wisconsin Public Service	11,000
Wisconsin Public Service	6,250
Total	283,700

Municipal and Other Public Plants	
Tennessee Valley Authority	48,600
Colorado Springs, Colo	5,000
Holyoke, Mass.	450
Seminoe Project, Wyo	32,400
Total	86,450

Internal Combustion

Private Companies	
Arizona Edison Co	1,360
Associated Gas & Electric System	625
Central Maine Power	175
Central Power & Light	500
Community Public Service	100
Idaho Power	275
Kansas Power	600
Public Utilities Calif. Corp	375
Texas-New Mexico Utilities	200
Western Public Service	1,270
Total	5,480

Municipal and Other Public Plants	
Bloomington, Ill.	500
Lubbuck, Texas	2,000
Total	2,500

* New plant.

TOTALS FOR 1939

Kilowatts	Private Companies	Municipal and Federal	Total
Steam	789,450	117,250	906,700
Hydro	283,700	86,450	370,150
Int. comb'n.	5,480	2,500	7,980
Total	1,078,630	206,200	1,284,830

GENERATING CAPACITY TO BE ADDED IN 1940

Steam

Private Companies	*Kw.*
Associated Gas & Electric Systems	38,500
Central Illinois Public Service	25,000
Central Maine Power	15,000
Central New York Power Corp	*80,000
Central Power & Light	*7,500
Columbia Gas & Electric	30,000
Commonwealth Edison	105,000
Consolidated Edison, N. Y.	65,000
Consolidated Gas Elec. Lt. & Pwr.	25,000
Consumers Power	*35,000
Dayton Power & Light	30,000
Delmarva Power	7,500
Detroit Edison	75,000
Duke Power	80,000
Florida Power & Light	25,000
Holyoke Water Power	5,000
Indiana & Michigan Electric	70,000
Iowa City Light & Power	4,000
Iowa Electric Light & Power	15,000
Jersey Central Power & Light	15,000
Kansas City Power & Light	35,000
Kansas Power & Light	15,000
Kentucky Utilities	20,000
Las Vegas Light & Power	1,875
Missouri Utilities	5,000
Montana-Dakota Utilities	5,000
New Mexico Power	1,875
Northern States Power	17,500
Pacific Gas & Electric	100,000
Panhandle Power & Light	23,000
Potomac Electric Power	50,000
Public Service of New Jersey	100,000
Public Service of Okla.	1,000
Virginia Electric Power	3,000
Virginia Electric Power	40,000
Western Public Service	2,500
Wisconsin Electric Power	35,000
Total	1,208,250

1940 Continued

Municipal and Other Public Plants	Kw.
Hope, Ark.	1,500
Burbank, Calif.	10,000
Glendale, Calif.	*20,000
Fort Pierce, Fla.	5,000
Decatur, Ind.	5,000
Fort Wayne, Ind.	15,000
Frankfort, Ind.	5,000
Muscatine, Iowa	7,500
McPherson, Kansas	5,000
Owensboro, Ky.	*15,000
Braintree, Mass.	10,000
Taunton, Mass.	6,000
Coldwater, Mich.	2,500
Holland, Mich.	15,000
Hibbing, Minn.	5,000
Columbia City, Mo.	2,500
Stillwater, Okla.	4,000
Columbia, Ohio	10,000
Martins Ferry, Ohio	*3,500
Orrville, Ohio	2,500
Springfield, Ohio	15,000
Manitowoc, Wisc.	10,000
Total	175,000

Hydro

Private Companies	
Associated Gas & Electric System	6,000
Central Maine Power	24,000
Copper District Power	*8,800
Pacific Gas & Electric	5,500
Pennsylvania Water Power & Safe Harbor W. P. Corp.	30,000
Public Service of Colo.	400
Virginia Electric & Power	2,100
Wisconsin Power & Light	2,500
Total	79,300

Municipal and Other Public Plants	
Tennessee Valley Authority	24,300
Tennessee Valley Authority	*138,600
Bureau of Reclamation (Boulder)	165,000
Elephant Butte, New Mexico	24,300
High Point, N. C.	21,000
South Carolina Pub. Service Authority	*133,000
Grand Coulee, Wash.	*20,000
Kaukauna, Wisc.	*2,400
Total	528,600

* New plant.

Internal Combustion

Private Companies	
Arizona Edison	160
Associated Gas & Electric System	700
Gulf States Utilities	500
Kansas Power	1,250
Kansas Utilities	1,000
Key West Electric	480
Louisiana Ice & Elec. Co.	1,200
Northwestern Public Service	1,000
Otter Tail Power	250
Sioux City Gas & Electric	1,600
West Texas Utilities	1,200
Western Light & Telephone	350
Total	9,690

Municipal and Other Public Plants	
Rochelle, Ill.	1,000
Goshen, Ind.	2,000
Huntington, Ind.	600
Sturgis, Mich.	1,750
Freeport, New York	2,000
Willard, Ohio	1,500
Denton, Texas	1,400
Total	10,250

(Includes small amount not yet definitely scheduled)

TOTALS FOR 1940

Kilowatts	Private Companies	Municipal and Federal	Total
Steam	1,208,250	175,000	1,383,250
Hydro	79,300	528,600	607,900
Int. comb'n.	9,690	10,250	19,940
Total	1,297,240	713,850	2,011,090

GENERATING CAPACITY PROSPECTIVELY TO BE ADDED IN 1941

Steam

Private Companies	Kw.
Alabama Power	*35,000
Atlantic City Electric Co.	25,000
Boston Edison	50,000
Central Illinois Light	35,000
Central New York Power	80,000
Cleveland Electric Ill.	60,000
Commonwealth Edison	50,000
Consolidated Edison, N. Y.	65,000
Consolidated Gas, E. Lt. & Power	50,000
Consumers Power	*35,000
Consumers Power	*20,000
Duke Power Plant	80,000
Georgia Power	*35,000
Iowa Public Service Co.	15,000
Narragansett Electric	40,000
Pennsylvania Power & Light	15,000
Pennsylvania Power & Light	20,000
Philadelphia Electric	50,000
Public Service of Indiana	*50,000
Public Service of N. J.	50,000
Union Electric of Mo.	80,000
United Illuminating	25,000
Wisc. Power & Light	30,000
Total	995,000

Municipal and Other Public Plants

None reported

* New plant.

Hydro

None reported

Internal Combustion

Private Companies

None reported

Municipal and Other Public Plants	
Wallingford, Conn.	1,000
South Hill, Va.	*600
Total	1,600

TOTALS FOR 1941

Kilowatts	Private Companies	Municipal and Federal	Total
Steam	995,000	.....	995,000
Hydro†	.....	.....	.....
Int. comb'n.	.....	1,600	1,600
Total	995,000	1,600	996,600

† No report on Federal projects.

STATION ECONOMICS

Steam use over 3,000 hours for first time — Drought curtails hydro output — Fuel efficiency makes good gain in 1939 — Superposition now ordinary practice

STEAM-DRIVEN electrical generating facilities were in use more average hours in 1939 than ever before. For the first time they were over 3,000 hours. They not only had to share in carrying a load increase that was not fully matched by a total capacity increase but after May they had to compensate for drought that curtailed hydro output quite generally over the nation.

The drought in the latter half of the year was not confined to a single section, but was a matter of national concern. Despite a 3 per cent increase in hydro-generating capacity there was a decrease of 3½ per cent in hydro output; this at a time when steam capacity was being enlarged 3 per cent and demands on combined capacity were increasing by 12 per cent as a result of the growing load.

One immediate consequence was that the hydro production in 1939 was only 47 per cent as much as from steam plants, whereas it had been 65 per cent in 1935, 59½ per cent in 1938, 55 per cent in 1937 and 53½ per cent in 1936. Yet the ratio of hydro to steam capacity (0.276) was higher in 1939 than for any year since 1930 except 1932, when it was 0.278.

During the first half of the year the hydro output was about 10 per cent ahead of corresponding months of the good year 1938. This was partly due to added hydro capacity, but more because the load and the water were available. But the deficiency began to show up in midsummer just as the load began a new rise. As a result the hydro output fell not only some 10 per cent behind 1938 months, but another 10 per cent below where it could have been had it been possible to continue at the spring rate of generation. As a result the average hours use of hydro fell off sharply for the year as is shown in the graph on the opposite page.

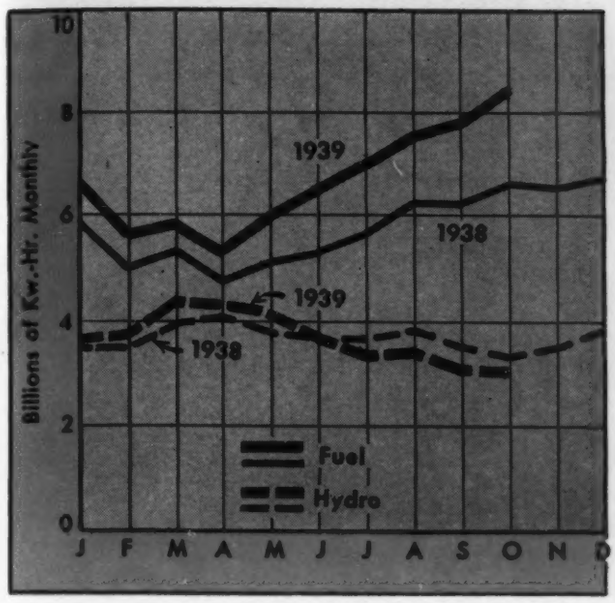
Every area in the country except the East South Central and Mountain States experienced this curtailment of total hydro generation. In the East South Central States the acute drought experienced fails to show up in the simple statistical data because of the availability during the year of new TVA capacity.

The year 1939 also marked the "coming of age" of a considerable number of high-pressure and superposed turbine installations. Several went into service two or three years ago, but they did not outgrow their "growing pains" until this year. Recent reports from operators of superposed installations indicate that this development has passed from the experimental stage and has become a matter of established practice.

The superposition has since been extended to cover the whole plant in instances where it had initially embraced only a portion of the low-pressure installation. Also, the developmental period for high-pressure boilers and turbines has been largely consummated and the installations are now performing with anticipated economy and reliability. As a result of these factors, in conjunction with the favorable loading, the steam plants of the country established a new low record of 1.37 pounds of coal-equivalent fuel consumed per kilowatt-hour output. After creeping downward by 0.01 and 0.02 pound steps since 1933, it has suddenly dropped 0.04 from the low of 1.41 pounds set in 1938.

The whole generating business, despite the improvement in pounds-per-kilowatt-hour fuel efficiency, because of the increased electrical activity and the drought, has kept the coal mines as busy as in 1929 supplying the industry. Gas use is up more than 50 per cent in the decade. Fuel oil use has also increased, but less rapidly.

FUEL AND HYDRO PRODUCTION



OUTPUT FROM FUEL AND FUEL CONSUMPTION

All public utility plants — Central stations, electric railway, electrified railroad, public works and other plants generating energy for public use

These statistics relate to all plants (not exclusively to central stations) having an output of 10,000 kw.-hr. per month, comprised in the totals reported each month, formerly by the U. S. Geological Survey, since July, 1936, by the F. P. C.

Year	Energy Generated from Fuel† (Millions of Kw.-Hr.)	Fuel Consumed				Pounds of Coal per Kw.-Hr.†
		Coal (Millions of Tons)	Oil (Millions of Bbl.)	Gas (Billions of Cu. Ft.)	Coal Equiv. (Millions of Tons)	
1919	24,175	35.10	11.05	21.41	38.88	3.2
1924	38,808	37.56	16.63	48.44	42.67	2.20
1929	62,295	44.94	10.18	112.71	52.64	1.69
1930	62,514	42.90	9.26	120.29	50.65	1.62
1931	60,791	38.73	8.12	139.33	47.13	1.55
1932	48,931	30.29	7.97	107.88	36.70	1.50
1933	50,542	30.58	9.94	102.60	37.16	1.47
1934	56,914	33.56	10.38	127.90	41.83	1.47
1935	59,176	34.16	11.39	125.24	43.19	1.46
1936	72,188	42.03	14.12	156.08	51.99	1.44
1937	76,883	44.77	14.14	171.27	55.14	1.43
1938	71,525	40.21	13.08	170.69	50.57	1.41
1939*	82,604	44.34	16.44	189.35	56.08	1.37

* Twelve months ended October 31. † Output by use of wood not included.

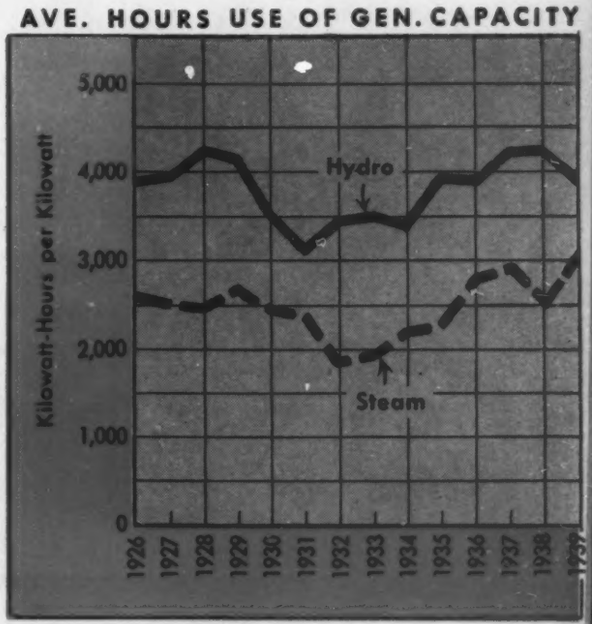
OUTPUT, CAPACITY, AVERAGE USE (by Source of Energy)

Source — Edison Electric Institute. (Electric Light and Power Industry Only)

Year	Energy Generated (Millions of Kw.-Hr.)			Generating Capacity at End of Year (Thous. Kw.)			Output per Kw. of Ave. Cap. (Kw.-Hr.)†		
	From Fuels	From Water Power	Total	Fuel	Hydro	Total	Fuel	Hydro	Total
1926	44,146	23,844	67,990	17,032	6,096	23,126	2,590	3,920	2,985
1927	46,863	26,382	73,244	18,724	6,554	25,278	2,620	4,180	3,026
1928	49,446	31,007	80,453	19,942	7,279	27,221	2,555	4,480	3,065
1929	59,128	30,956	90,084	22,120	7,439	29,559	2,810	4,210	3,184
1930	59,387	29,205	88,592	23,843	8,207	32,050	2,580	3,730	2,876
1931	58,038	27,537	85,575	24,271	8,806	33,077	2,410	3,240	2,628
1932	45,913	30,801	76,714	24,941	8,923	33,864	1,860	3,470	2,292
1933	47,577	31,356	78,933	24,759	8,975	33,734	1,910	3,500	2,335
1934	53,917	31,069	84,986	24,384	9,141	33,524	2,190	3,270	2,527
1935	56,068	36,543	92,611	24,600	9,288	33,888	2,280	3,970	2,748
1936	69,336	37,230	106,566	24,721	9,539	34,260	2,810	3,950	3,127
1937	74,206	40,959	115,166	25,326	9,634	34,960	2,960	4,270	3,330
1938	68,765	40,926	109,691	26,666	9,664	36,330	2,650	4,220	3,065
1939*	83,600	39,400	123,000	27,531	9,935	37,466	3,040	3,940	3,280

* Estimated, on the basis of ten months operations.
† Equivalent to average hours use of capacity.

AVE. HOURS USE OF GEN. CAPACITY



ENERGY GENERATED FROM FUELS AND WATER POWER

(By Regions) (Billions of Kilowatt-Hours)

Region	1935		1936		1937		1938		1939	
	Fuel	Hydro	Fuel	Hydro	Fuel	Hydro	Fuel	Hydro	Fuel	Hydro
N.E.	3.58	2.72	4.37	2.62	4.27	3.17	3.72	3.21	5.08	2.71
M.A.	15.85	7.32	19.77	6.77	20.64	7.97	19.65	7.71	23.85	6.50
E.N.C.	20.00	2.35	23.96	2.06	25.92	2.26	23.22	2.77	27.56	2.48
W.N.C.	4.29	2.05	5.39	1.43	5.67	1.85	5.36	1.95	5.98	1.64
S.A.	4.79	5.61	6.48	6.00	6.79	6.90	7.11	5.49	9.14	5.19
E.S.C.	0.74	3.10	1.10	3.45	1.58	3.50	1.57	4.12	1.72	4.67
W.S.C.	4.38	0.29	5.18	0.17	6.11	0.25	6.13	0.23	6.91	0.17
M.	0.80	2.53	1.01	3.00	1.24	3.07	1.02	3.16	1.29	5.15
P.	1.63	10.58	2.08	11.74	2.01	12.00	0.98	12.29	2.07	10.89
U.S.	56.07	36.54	69.34	37.23	74.21	40.96	68.77	40.93	83.60	39.40

Source: Edison Electric Institute.

ENERGY SALES

Exceed 100 billion kw.-hr. for first time —Total 107 billion—Increase over 1938 13½ per cent, over previous record year 7 per cent—Industrial rose sharply, but still below year 1937

FOR the first time in the history of the electric utility industry sales exceeded a hundred billion kilowatt-hours. The total of 107 billion was 13½ per cent greater than the output of 1938 and some 7 per cent higher than the previous peak, which was established two years ago. This advancement of total energy sales to a new highest record is all the more significant when compared to other business indices. Car loadings and building activity, for example, are still but a fraction of the levels reached ten years ago. General indices of business as a whole are only approaching 1929 levels, while electric energy sales are some 42 per cent greater than 1929.

As 1938 registered the sharpest drop in sales, so did 1939 register the sharpest improvement. The increase over the previous year was the largest ever recorded. This was due very largely to the gain in industrial sales. This classification also had its greatest increase in volume in any one year, but it was not enough to wipe out the decrease of the previous year, so that 1939 industrial sales were slightly below those of 1937.

Up until 1938 industrial sales were always more than half the total; 1939 just missed being half by a hairbreadth, compared with 51-54 per cent in the 1933-1936 era, 57 per cent in 1929 and 62 per cent in 1920. A twelve-month program of good industrial business would probably re-establish the pre-depression balance between classes of business.

Strangely enough, the aggregate growth during the past year in other than industrial sales was approximately the same as was registered in the '20s for all sales. Indications are that the rate of progress has been reestablished. The continuance of this rate, however, is dependent upon general business conditions.

It is interesting to note that the increase in industrial sales during 1939 closely parallels the increase of 21 per cent in the index of *Business Week*. On the other hand, while general business indices show current activity to be at or near 1929 levels, industrial energy sales are nearly 25 per cent above 1929.

Residential and commercial sales are continuing their neck-and-neck race to new high levels. The former was up 8.64 per cent and the latter 7.36 per cent. Their rate of growth begun in 1933 has continued with slight interruption ever since. Farm sales hit a new high of three and one-third billion, an increase of 31.3 per cent. Electrified divisions of steam railroads also took 31 per cent more energy. Almost the same increase was registered in municipal and miscellaneous sales. Municipal street-lighting sales, on the other hand, as well as street and interurban railway sales, were below last year's totals.

Since 1929 total sales were up about 43 per cent; prior to 1929 sales more than doubled in each ten-year period. Farm sales and residential sales more than doubled, while commercial increased 52 per cent and industrial more than 10 per cent.

These figures more than anything else indicate not only the reasons for the economic health of the industry but for the trend of expansion.

Intensification of load building in the residential and commercial groups is producing the revenue necessary to offset reduced rates and higher taxes. Growth of industrial load, which has always been largely responsible for great increases in capacity, is more dependent upon general business, although it too is susceptible of cultivation. Large increases in capacity, therefore, cannot be expected to occur regularly, as was the case before 1929, but only following periods of great industrial expansion.

ENERGY SALES TO ULTIMATE CONSUMERS

(In Millions of Kw.-Hr.)

Year	Farm	Residential	Commercial Small Light and Power	Commercial Large Light and Power	Municipal Street Lighting	Street and Interurban Electric Railways	Electrified Divisions of Steam Railroads	Municipal and Miscellaneous	Total to Ultimate Consumers
1920	†	†2,950	4,140	19,997	‡723	§4,820	§	‡	32,630
1923	†	†4,420	6,380	24,665	‡1,055	§5,700	§	‡	42,220
1926	723	6,727	9,485	31,992	1,589	4,951	426	196	56,089
1927	861	7,538	10,766	34,539	1,741	5,039	504	262	61,251
1928	1,387	8,420	11,692	37,715	1,911	4,991	560	312	66,988
1929	1,602	9,526	13,106	42,971	2,038	5,049	590	412	75,294
1930	1,789	10,703	13,944	40,148	2,227	4,996	591	508	74,906
1931	1,879	11,373	13,544	36,937	2,330	4,549	626	664	71,902
1932	1,579	11,494	12,106	30,965	2,033	4,040	568	926	63,711
1933	1,633	11,358	11,589	33,857	1,893	3,991	668	927	65,916
1934	1,858	12,233	12,278	36,943	1,896	4,237	692	945	71,082
1935	1,693	13,496	13,588	40,864	2,078	4,194	841	842	77,596
1936	2,138	14,992	15,612	48,655	2,223	4,401	1,115	908	90,044
1937	2,389	16,875	17,558	53,546	1,909	4,450	1,265	1,453	99,446
1938	2,528	18,461	18,316	44,900	1,963	4,008	1,451	2,267	93,894
1939*	3,320	19,820	19,900	53,400	1,830	3,900	1,900	2,930	107,000

Sources: 1920–1925, *Electrical World;* 1926–1938, Edison Electric Institute.
* Ten months actual, two months estimated.
† Farm included with residential.
‡ Municipal and miscellaneous combined in municipal street lighting.
§ Electrified railways combined in street railways.

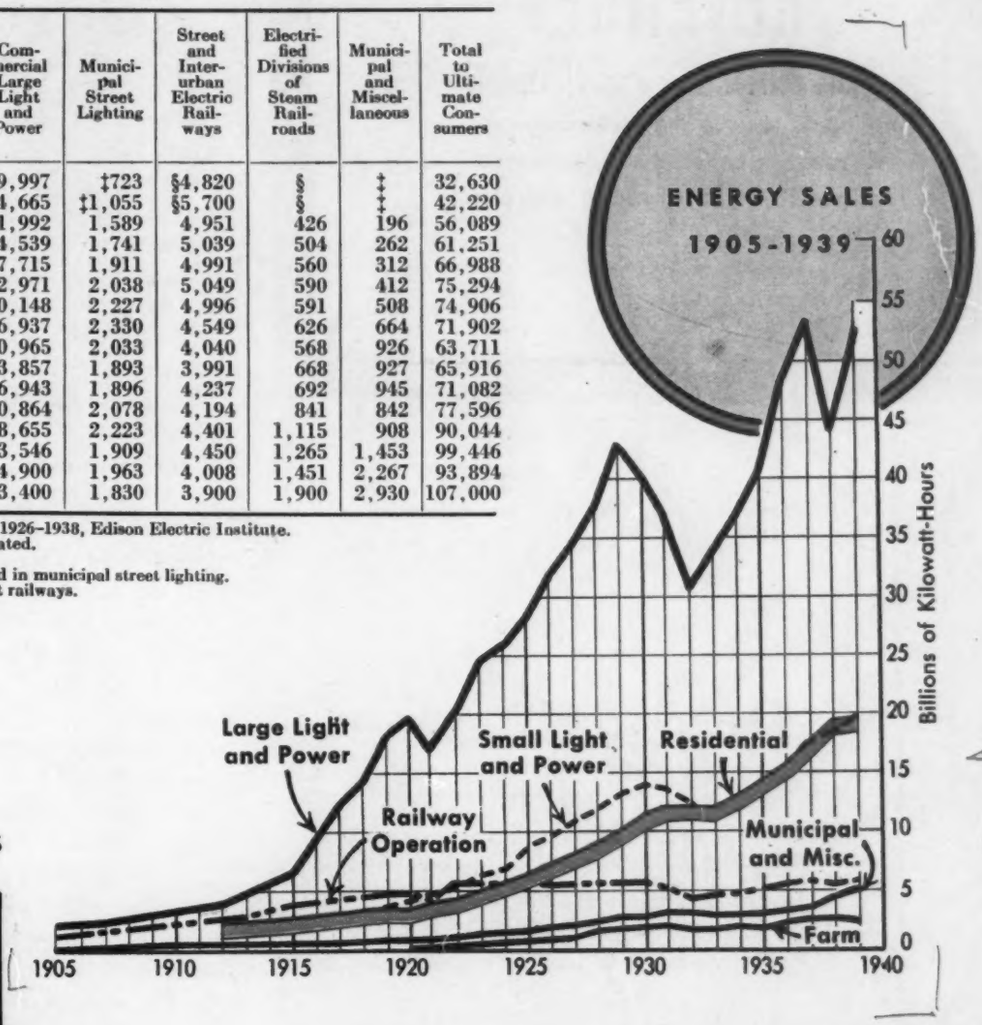
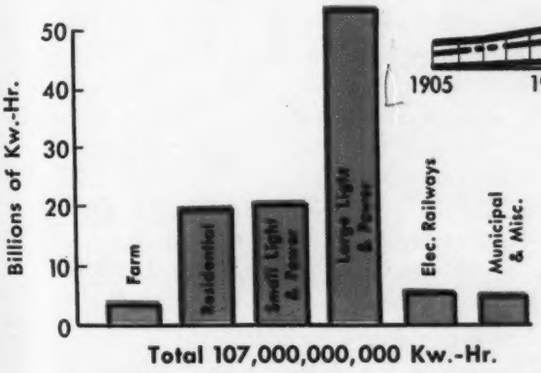


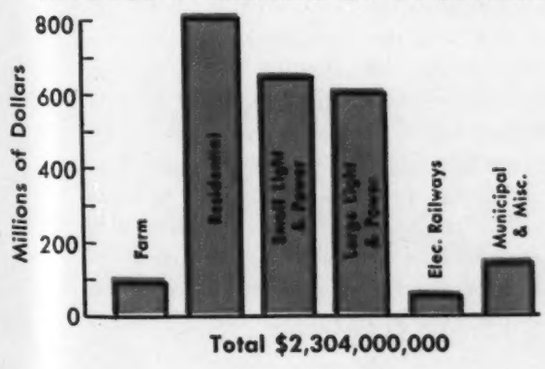
Chart B

ENERGY USE BY CLASSES OF CONSUMERS

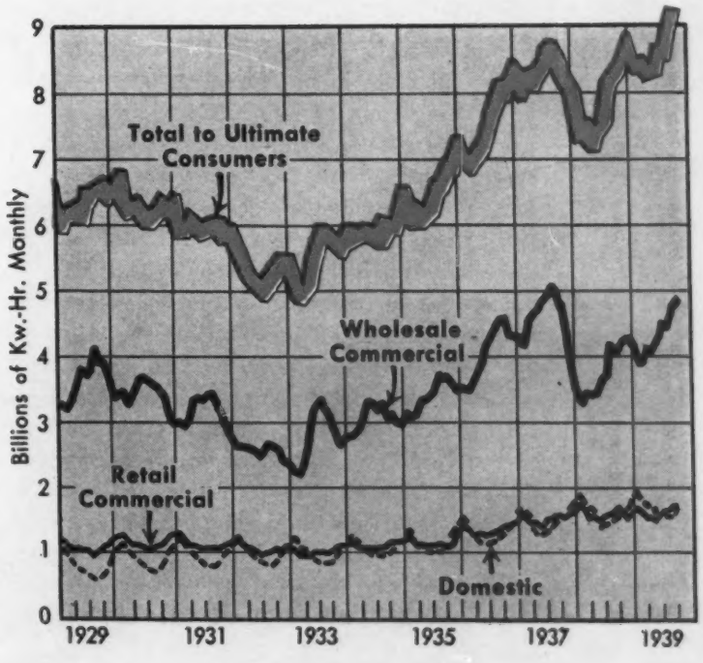


Total 107,000,000,000 Kw.-Hr.

REVENUE BY CLASSES OF CONSUMERS



Total $2,304,000,000



REVENUE

Average residential service rate goes to new low of 4.06 cents — Revenue per unit of increased domestic sales dropped sharply

DURING 1939 the electric utility industry sold to the farms, homes, factories, shops and stores of the nation 14 per cent more kilowatt-hours than in 1938. The bill for this increase was, however, only 6 per cent higher than in 1938. Thus in 1939 the industry picked up momentum in its dual purpose of selling more kilowatt-hours to America and selling more added kilowatt-hours per added dollar of revenue. Furthermore, the 1939 gains of about 13 billions in energy sales and of about $132,000,000 in revenues just about equal previous respective highs attained in 1936.

The increases in residential sales from 1936 to 1937 and from 1937 to 1938 showed revenues per increment kilowatt-hour of 2.29 and 2.38 cents respectively. But for the increase from 1938 to 1939 the revenue per increment unit dropped to 1.82 cents. In searching for the causes of this drop, the first fact encountered is that 1939 is the second highest year in the history of the industry as regards rate reductions. Another possible contributor to the condition is probably increased sale and use of major appliances in the home. But whatever the causes may be, the revenue per kilowatt-hour of growth in residential sales from 1938 to 1939 does indicate the need for continuance and enlargement of selective load building in this field.

Characteristic of the electric utility industry in its service to the nation is the fact that it continues the trend of decrease in cost of electricity to the user by establishing a new low of 4.05 cents per average kilowatt-hour for residential service. In 1929 the price was 55 per cent higher. In the short space of ten years the average residential customer's purchase of energy has increased 80 per cent, but his bill has increased only 16.4 per cent. The bill has increased only one-fifth as fast as usage has increased.

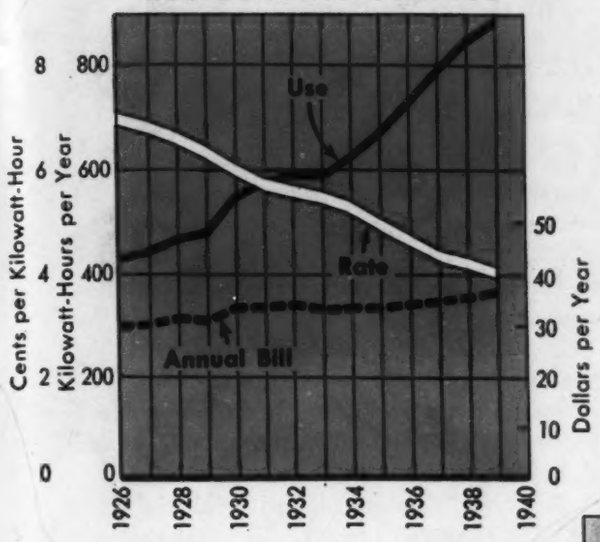
Farm revenues reached a new high of $94,000,000 in 1939 and the $18,000,000 gain over 1938 is the maximum for any year. In 1936 an $11,000,000 gain was recorded, as also in 1928. But the 1939 gain far exceeds these and indicates results from intensive load building that are truly outstanding.

Revenue from small light and power sales reached a new high of $640,800,000 and for the second year exceeded industrial revenue. The manner in which small light and power revenue supports utility earnings was well illustrated a year ago when industrial revenue fell sharply. Again this year small light and power contributed the creditable percentage of 27.8 to total revenue. As a goal the industry might add to present efforts and strive to re-establish the residential-commercial equality of pre-1929.

The large light and power (industrial) revenue was fast recovering the drop of 1938 and at the year end was within $15,000,000 of the 1937 high of $615,000,000. The rest of the story on revenue, like the story on energy sales, is one of increases to highest levels for all but two of the minor classifications. The exceptions are street lighting and street railways, both of which showed revenue declines in 1939.

Examination of the shifting pattern through the years of the proportions of the different classes of revenue, as shown in the table opposite, reveals both the accomplishments and the adversities of the electric utilities. The increasing contributions to the total made by residential revenue reflect the success of efforts in domestic load building. The varying levels of large light and power revenues indicate the ups and downs of industry. Government subsidization of municipal systems shows up in the decline of revenue from municipal customers. Here in this table is the vital history of the electric utility industry.

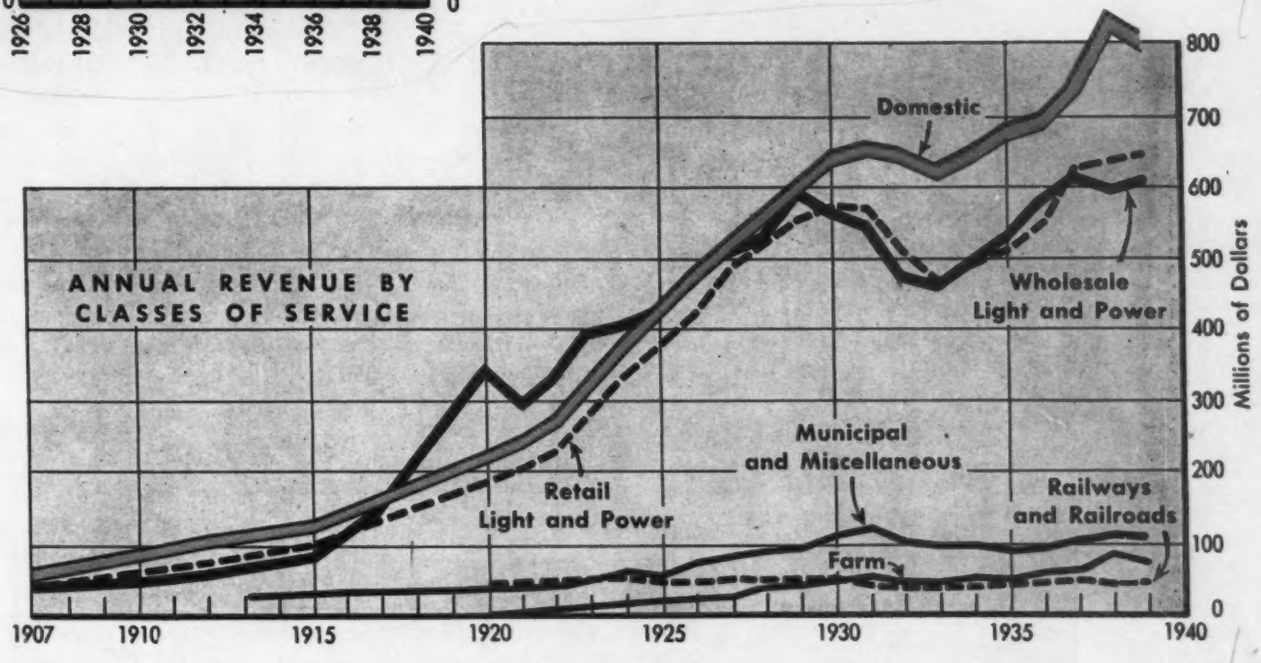
AVERAGES FOR RESIDENTIAL SERVICE



RESIDENTIAL SERVICE to Urban and Non-Farm Homes

Year	Kw.-Hr. per Customer	Average Annual Bill (Dollars)	Revenue per Kw.-Hr. (Cents)
1926	428	29.87	6.98
1927	444	30.19	6.80
1928	460	30.36	6.60
1929	499	31.44	6.30
1930	543	32.58	6.00
1931	578	33.18	5.74
1932	597	33.25	5.57
1933	595	32.67	5.49
1934	624	33.07	5.30
1935	672	33.53	4.99
1936	727	33.81	4.65
1937	793	34.81	4.39
1938	845	35.57	4.21
1939*	890	36.05	4.05

(E.E.I.) * Ten months actual, two months estimated



REVENUE FROM ULTIMATE CONSUMERS (in Thousands of Dollars)

Year	Farm	Residential	Commercial Small Light and Power	Commercial Large Light and Power	Municipal Street Lighting	Street and Interurban Electric Railways	Electrified Divisions of Steam Railroads	Municipal and Miscellaneous	Total Revenue from Ultimate Consumers
1920	†	†223,500	185,400	337,500	‡39,320	§42,000	§	‡	827,720
1923	†	†323,000	276,800	393,000	‡54,750	§52,200	§	‡	1,099,750
1926	21,637	469,272	427,407	476,187	68,023	47,617	4,372	5,641	1,520,159
1927	25,329	512,329	482,135	504,488	77,248	47,965	5,172	5,747	1,661,032
1928	36,540	555,894	519,957	529,173	83,024	46,488	5,559	7,670	1,743,809
1929	40,665	600,265	555,640	591,038	88,323	46,277	5,986	10,322	1,938,520
1930	46,689	642,275	575,598	566,467	95,458	46,067	6,015	12,382	1,990,955
1931	50,726	653,282	564,523	544,728	99,298	41,912	6,725	14,746	1,975,944
1932	47,127	640,384	500,993	474,424	89,828	36,701	6,181	18,076	1,813,717
1933	46,501	623,797	471,780	468,389	83,097	35,098	6,658	19,243	1,754,366
1934	49,182	648,801	490,420	499,451	81,846	36,402	6,680	19,085	1,831,870
1935	48,404	673,526	519,213	531,106	79,429	36,431	7,944	15,933	1,911,988
1936	59,286	696,997	562,122	581,148	80,791	37,423	9,591	17,225	2,044,586
1937	67,947	740,219	604,848	615,049	74,200	37,542	10,671	30,312	2,180,788
1938	75,946	778,003	609,281	545,947	74,700	34,072	12,035	¶38,511	2,168,495
1939*	94,000	802,800	640,800	600,300	72,400	32,500	14,500	¶46,700	2,304,000

Sources: 1920–1925, *Electrical World*, estimated allocations; 1926–1938, Edison Electric Institute.
* Ten months actual, two months estimated. † Farm included with residential.
‡ Municipal and miscellaneous combined in municipal street lighting. § Electrified railroads combined with street railways.
¶ About 4,000 in interdep't not previously incl. in sales.

CUSTOMERS

Addition of 900,000 makes year one of the largest—Farms account for 40 per cent increase—New classifications in commercial and industrial make comparison impossible

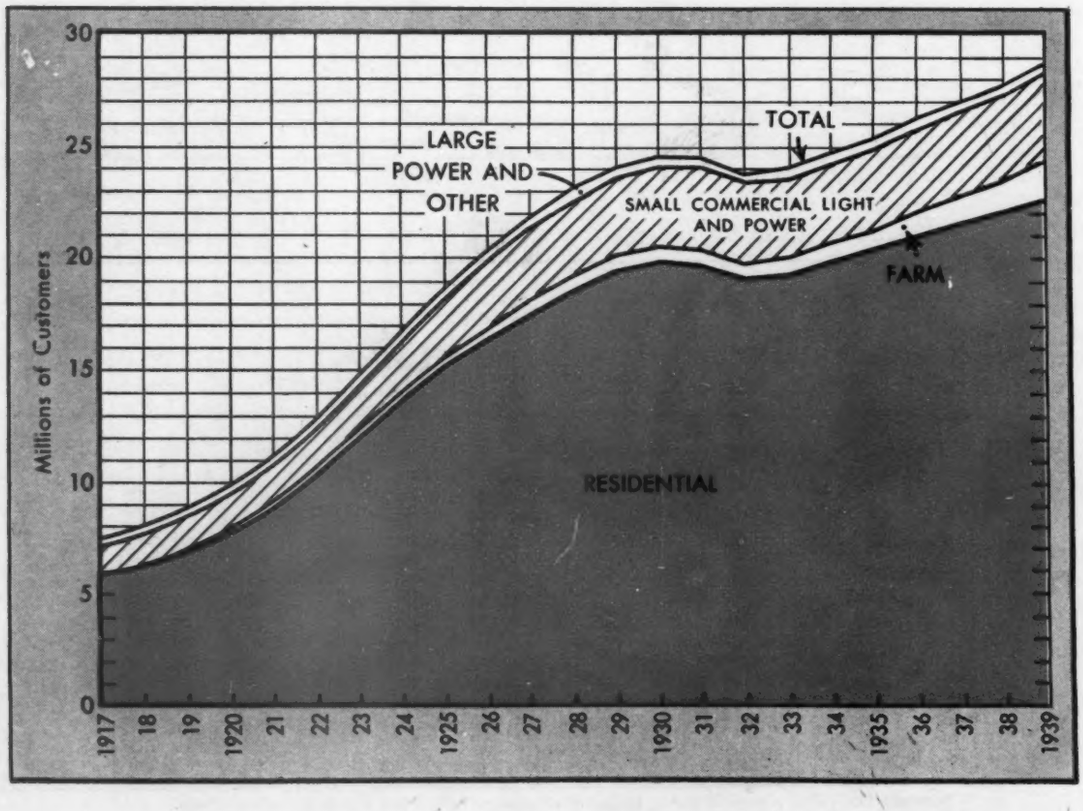
WITH an increase of 900,000 customers, 1939 stands out as one of the record years in adding new customers since the days of old house wiring drives in the '20s. The only difference is that today the drive is to wire old farm buildings.

Last year 380,000 farms were added and 555,000 new residentials. This was a 27 per cent farm increase and more than double the number added the previous year. To some extent, however, the farm figures have been raised by reclassification of commercial customers. The effect of some of this will be seen in the 40,000 decrease in commercial and industrial customers.

Two-thirds of the new farm customers last year were on REA lines. The total of all farm customers roughly is 1,800,000, divided between service as follows: REA, 400,000; private utilities, 1,400,000.

This year commercial and industrial customers are lumped together. The total shows a loss. This as stated is due to reclassification. For that reason the figures for the two years in this group are not comparable. Part of the apparent loss is reflected in the 4,447 gain in municipal, rail and miscellaneous customers; the rest will be found in the farm group.

Ultimately it is expected that all customer statistics will be reported by user groups rather than by rate classifications. When this is accomplished the data will be more enlightening.



CENTRAL STATION CUSTOMERS AT END OF YEAR*

Regional or State	Total Number			Farms Served			Residential			Commercial and Industrial			Municipal, Rail and Miscellaneous		
	1939	1938	Change in 1939	1939	1938	Change in 1939	1939	1938	Change in 1939	1939	1938	Change in 1939	1939	1938	Change in 1939
UNITED STATES	**28,750,000**	**27,851,471**	**898,529**	**1,786,000**	**1,406,579**	**379,421**	**22,665,243**	**22,110,403**	**554,840**	**4,190,860**	**4,231,039**	**(40,179)**	**107,897**	**103,450**	**4,447**
NEW ENGLAND	**2,475,900**	**2,425,563**	**50,337**	**88,300**	**83,843**	**4,457**	**2,035,101**	**1,988,835**	**46,266**	**345,200**	**346,533**	**(1,333)**	**7,299**	**6,352**	**947**
Maine	224,900	214,632	10,268	19,000	18,200	800	169,152	160,332	8,820	34,400	34,000	400	2,348	2,100	248
New Hampshire	143,000	139,888	3,112	10,300	10,143	157	112,074	109,033	3,041	18,900	19,011	(111)	1,726	1,701	25
Vermont	92,000	88,886	3,114	9,900	9,008	892	66,198	64,225	1,973	15,100	15,010	90	802	643	159
Massachusetts	1,311,000	1,292,923	18,077	22,900	21,492	1,408	1,101,037	1,084,188	16,849	185,100	185,768	(668)	1,963	1,475	488
Rhode Island	202,000	200,958	1,042	4,000	4,000	0	170,960	170,968	(8)	26,800	25,711	1,089	240	279	(39)
Connecticut	503,000	488,276	14,724	22,200	21,000	1,200	415,680	400,089	15,591	64,900	67,033	(2,133)	220	154	66
MIDDLE ATLANTIC	**7,640,000**	**7,516,109**	**123,891**	**234,000**	**210,566**	**23,434**	**6,215,109**	**6,123,038**	**92,071**	**1,171,800**	**1,163,315**	**8,485**	**19,091**	**19,190**	**(99)**
New York	3,990,000	3,938,190	51,810	100,000	93,332	6,668	3,247,707	3,207,986	39,721	634,000	629,276	4,724	8,293	7,596	697
New Jersey	1,260,000	1,220,129	39,871	24,000	21,200	2,800	1,032,891	999,931	32,960	200,700	195,922	4,778	2,409	3,076	(667)
Pennsylvania	2,390,000	2,357,790	32,210	110,000	96,034	13,966	1,934,511	1,915,121	19,390	337,100	338,117	(1,017)	8,389	8,518	(129)
EAST NORTH CENTRAL	**6,815,000**	**6,583,397**	**231,603**	**524,500**	**401,031**	**123,469**	**5,371,070**	**5,254,101**	**116,969**	**895,400**	**905,236**	**(9,836)**	**24,030**	**23,029**	**1,001**
Ohio	1,820,000	1,757,510	62,490	140,000	104,384	35,616	1,429,749	1,398,679	31,070	240,600	245,404	(4,804)	9,651	9,043	608
Indiana	835,000	794,126	40,874	89,500	66,447	23,053	622,675	605,745	16,930	117,500	116,918	582	5,325	5,016	309
Illinois	2,030,000	1,992,841	37,159	80,000	58,898	21,102	1,689,969	1,665,564	24,405	255,600	263,464	(7,864)	4,431	4,915	(484)
Michigan	1,370,000	1,308,231	61,769	133,000	103,712	29,288	1,059,711	1,029,984	29,727	175,400	172,787	2,613	1,889	1,748	141
Wisconsin	760,000	730,689	29,311	82,000	67,590	14,410	568,966	554,129	14,837	106,300	106,663	(363)	2,734	2,307	427
WEST NORTH CENTRAL	**2,742,500**	**2,610,365**	**132,135**	**198,200**	**145,540**	**52,660**	**2,091,195**	**2,014,847**	**76,348**	**442,930**	**440,668**	**2,262**	**10,175**	**9,310**	**865**
Minnesota	570,400	547,832	22,568	35,000	21,910	13,090	434,938	426,026	8,912	98,700	98,491	209	1,762	1,405	357
Iowa	563,000	520,866	42,134	61,000	46,973	14,027	423,056	397,890	25,166	77,100	74,736	2,364	1,844	1,267	577
Missouri	765,000	731,329	33,671	43,000	33,423	9,577	600,948	578,508	22,440	119,500	117,706	1,794	1,552	1,692	(140)
North Dakota	85,100	81,568	3,532	4,800	3,449	1,351	60,056	58,063	1,993	19,530	19,499	31	714	557	157
South Dakota	99,000	95,558	3,442	3,900	3,380	520	76,800	74,200	2,600	17,640	17,572	68	660	406	254
Nebraska	272,000	255,888	16,112	24,500	15,982	8,518	199,658	192,526	7,132	46,660	46,245	415	1,182	1,135	47
Kansas	388,000	377,324	10,676	26,000	20,423	5,577	295,739	287,634	8,105	63,800	66,419	(2,619)	2,461	2,848	(387)
SOUTH ATLANTIC	**2,505,200**	**2,387,522**	**117,678**	**207,800**	**147,943**	**59,857**	**1,927,616**	**1,864,165**	**63,451**	**359,310**	**365,819**	**(6,509)**	**10,474**	**9,595**	**879**
Delaware	57,000	56,915	85	3,200	3,045	155	44,368	44,307	61	9,170	9,320	(150)	262	243	19
Maryland-Dist. of Columbia	562,200	556,281	6,919	17,800	16,765	1,035	467,761	459,772	7,989	77,050	79,132	(2,082)	589	612	(23)
Virginia	380,000	353,621	26,379	38,000	28,140	9,860	286,278	270,790	15,488	53,600	53,093	507	2,122	1,598	524
West Virginia	270,000	254,525	15,475	22,000	13,163	8,837	209,730	198,023	11,707	36,500	41,830	(5,330)	1,770	1,509	261
North Carolina	400,000	386,952	13,048	49,500	37,883	11,617	305,865	299,562	6,303	42,700	47,693	(4,993)	1,935	1,814	121
South Carolina	160,000	149,043	10,957	23,000	17,098	5,902	111,440	106,424	5,016	25,140	24,774	366	420	747	(327)
Georgia	325,000	296,845	28,155	40,100	21,157	18,943	228,616	219,690	8,926	55,650	55,422	228	634	576	58
Florida	350,000	333,340	16,660	14,200	10,692	3,508	273,558	265,597	7,961	59,500	54,555	4,945	2,742	2,496	246
EAST SOUTH CENTRAL	**1,096,000**	**1,029,328**	**66,672**	**127,200**	**77,729**	**49,471**	**796,572**	**770,574**	**25,998**	**165,940**	**175,471**	**(9,531)**	**6,288**	**5,554**	**734**
Kentucky	338,000	321,300	16,700	29,800	15,730	14,070	255,995	251,938	4,057	49,300	50,816	(1,516)	2,905	2,816	89
Tennessee	330,000	326,535	3,465	38,000	26,648	11,352	240,738	246,695	(5,957)	50,100	52,239	(2,139)	1,162	953	209
Alabama	270,000	252,140	17,860	37,000	27,764	9,236	193,270	178,520	14,750	38,870	45,265	(6,395)	860	591	269
Mississippi	158,000	129,353	28,647	22,400	7,587	14,813	106,569	93,421	13,148	27,670	27,151	519	1,361	1,194	167
WEST SOUTH CENTRAL	**1,712,400**	**1,614,074**	**98,326**	**106,700**	**67,075**	**39,625**	**1,290,036**	**1,235,028**	**55,008**	**304,260**	**300,080**	**4,180**	**11,404**	**11,891**	**(487)**
Arkansas	167,400	151,406	15,994	16,100	9,271	6,829	117,752	109,745	8,007	31,660	30,600	1,060	1,888	1,790	98
Louisiana	285,000	260,660	24,340	15,400	8,393	7,007	224,279	208,415	15,864	44,300	42,361	1,939	1,021	1,491	(470)
Oklahoma	335,000	319,683	15,317	21,200	14,615	6,585	248,337	240,337	8,000	63,000	62,272	728	2,463	2,459	4
Texas	925,000	882,325	42,675	54,000	34,796	19,204	699,668	676,531	23,137	165,300	164,847	453	6,032	6,151	(119)
MOUNTAIN	**814,400**	**790,890**	**23,510**	**83,500**	**70,090**	**13,410**	**607,821**	**595,552**	**12,269**	**118,710**	**121,090**	**(2,380)**	**4,369**	**4,158**	**211**
Montana	110,000	104,341	5,659	6,600	4,847	1,753	85,818	82,226	3,592	16,250	16,040	210	1,332	1,228	104
Idaho	115,000	109,231	5,769	24,000	21,428	2,572	75,694	72,806	2,888	14,180	13,893	287	1,126	1,104	22
Wyoming	45,600	42,453	3,147	3,600	2,079	1,521	34,430	32,768	1,662	7,470	7,516	(46)	100	90	10
Colorado	243,800	239,148	4,652	17,100	11,911	5,189	188,724	186,912	1,812	37,600	40,011	(2,411)	376	314	62
New Mexico	47,500	46,646	854	3,400	2,300	1,100	34,410	34,637	(227)	9,510	9,560	(50)	180	149	31
Arizona	96,000	95,801	199	8,000	7,082	918	73,569	74,353	(784)	14,130	14,068	62	301	298	3
Utah	130,900	128,819	2,081	19,500	19,172	328	95,436	93,490	1,946	15,050	15,278	(228)	914	879	35
Nevada	25,600	24,451	1,149	1,300	1,271	29	19,740	18,360	1,380	4,520	4,724	(204)	40	96	(56)
PACIFIC	**2,948,600**	**2,894,223**	**54,377**	**215,800**	**202,762**	**13,038**	**2,330,723**	**2,264,263**	**66,460**	**387,310**	**412,827**	**(25,517)**	**14,767**	**14,371**	**396**
Washington	510,000	488,382	21,618	55,500	50,184	5,316	388,795	373,708	15,087	63,730	62,723	1,007	1,975	1,767	208
Oregon	296,600	286,646	9,954	35,800	32,578	3,222	212,377	207,415	4,962	46,880	45,210	1,670	1,543	1,443	100
California	2,142,000	2,119,195	22,805	124,500	120,000	4,500	1,729,551	1,683,140	46,411	276,700	304,894	(28,194)	11,249	11,161	88

Source: Edison Electric Institute. 1939 estimated on basis of first ten months. * Indicated losses ( ) are in general due to reclassification.

THREE SIGNIFICANT YEARS

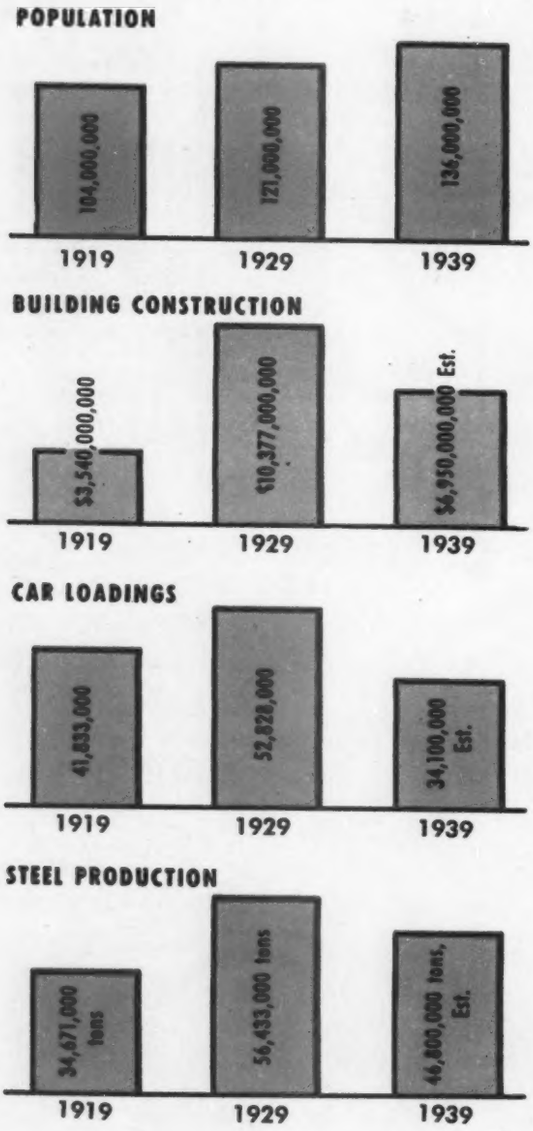
1919-1929-1939

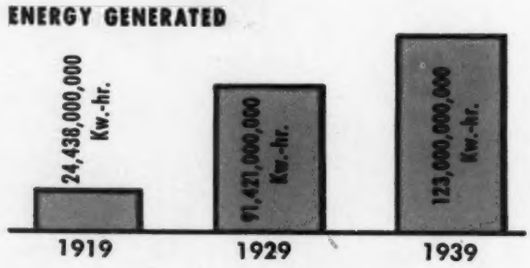
AT MIDNIGHT of December 31, just past, there ended a twenty-one-year period the first, middle and last years of which are significant. The first year of peace after more than four years of war, 1919 opened an era of industrial development and expansion. Late in 1929 occurred the stock market crash, presaging the depression period. And 1939 is just ten years later.

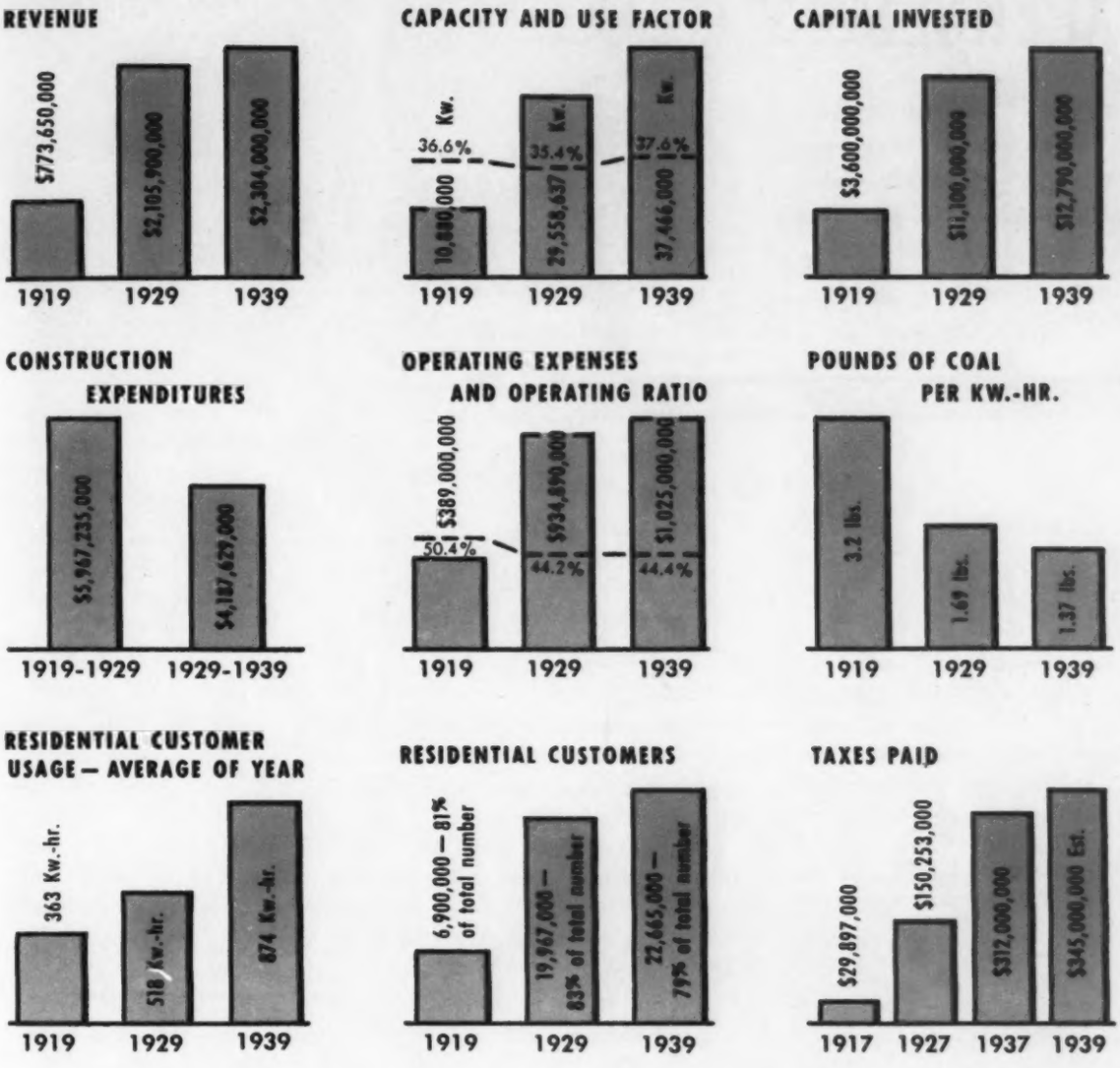
Building construction, car loadings and steel production rose high from 1919 to 1929 and electricity generation rose with them. Then the three former figures dropped after 1929 and have not yet recovered the ground they lost. Electricity, on the other hand, has not only reattained the 1929 figure, but has gone higher.

In the decade 1919–1929 the number of customers increased rapidly as the industry busied itself in bringing electric service to the homes of the nation. By 1929 this job had been practically accomplished. After 1929 the electric utilities realized that connection of new customers could now do no more than keep pace with population growth and that business increase must be sought in larger sales to existing customers. How successfully they sought is evidenced in the chart of residential customer average usage.

The chart of expenditures for new construction is to be particularly noted. Contrary to the popular idea that the electric utilities have spent very little money on new construction in the past ten years, these figures show they laid out nearly 70 per cent as much as in the preceding ten of recognized rapid growth. But even though less money was spent on new capacity in the second decade, it does not follow that there is any present deficiency in this respect. This is







clearly apparent from the capacity chart, on which is imposed the figures for use factor in the three significant years. In 1919 productive capability was 36.6 per cent utilized and in 1939 only 1 per cent more.

Great strides have been made in the techniques of electricity production and distribution since 1919. Indication of this progress appears in the chart of coal per kilowatt-hour for the three significant years. But the cost reductions accomplished by these improvements in the art were realized by holders of the industry's securities to a much lesser degree in the second of the two decades than in the first. This is shown by the fact that while operating ratio (excluding taxes) dropped from 50.4 per cent in 1919 to 44.2 in 1929, it actually rose slightly in 1939. Part of the reason for this lies in higher costs of fuel, supplies, labor, etc., but mostly the cause is rate reductions, the effect of which is clearly apparent from comparison of the increases shown in the charts of energy generated and of revenue received. Illustrative of the rise in costs of doing business imposed on the electric utilities is the chart of taxes, which were multiplied nearly twelve times in the years from 1917 to 1939.

In the expansive years from the World War to 1929 the electric utilities kept pace with the other industries of the nation in the general upward movement. But while the others turned downward in the unhappy '30s, the utilities dug in their toes, and after a short interlude continued to climb. This is the record.

EXPENSES

Increase but 21 million in face of 115 million more revenue—Operating ratio improved—Taxes up 20 million—Equal 16 per cent

ON PREVIOUS pages it was noted that despite new high records in output, sales and revenues the amount carried down to net earnings was, for example, less than that in 1929.

The primary question which arises relates to the part played by management, to its efficacy in controlling expenses during the past year, as represented by the operating ratio. Turning first to those expenses which are controllable by management, it is observed that while revenues were increasing by $115,000,000 to $2,165,000,000, operating expenses increased by $21,000,000 to $810,000,000. As a result the operating ratio of the industry dropped a full per cent. Thus, as added dollars came into the companies' cash registers in 1939, effective control over expenditures made possible the retention of an added cent per dollar of revenue.

This increase in expenses looks small, and it is possible that revised figures may show a change. The explanation given is that there were few increased expenses other than for fuel for added output. This may be so, for it is noticed that there was no change in employment and but slight rise in salaries and wages.

Preliminary figures, the latest now available, indicate further that the gain was not absorbed by increased taxes. At the same time that operating expenses were increasing $21,000,000 to $810,000,000, the tax bill was increasing $20,000,000 to a total of $345,000,000. Yet the joint increase of $41,000,000 was not enough to prevent a salutary drop in "operating ratio after taxes" of 1.1 cents per dollar. Thus, despite increases in operating expenses and increases in taxes, the full point gain in operating ratio during the past year was retained even after taxes were deducted.

The tax bill of $345,000,000 (16 per cent) paid by utilities in 1939 is the highest yet reached. It lacks only $85,000,000 of equaling the total salaries and wages paid by privately owned utilities. For every dollar paid in wages and salaries, 80 cents is paid to the tax collectors.

If the tax bill could be used instead to pay wages, then at current levels the $345,000,000 tax bill would pay an army of 185,000 utility employees!

For every dollar paid out for fuel in 1939, $1.88, or nearly double, was paid out for taxes. For every dollar paid out for maintenance of plant and equipment $2.13 was paid out for taxes.

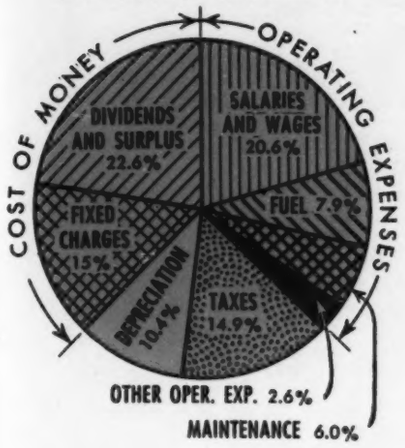
From the record it appears, therefore, that the utility industry has reached full stature as a tax-collecting agency to the tune of $945,000 per day, and at the rate taxes are increasing it might be over a million dollars a day in 1940.

Census data available this year make it possible to survey the municipal plants, as well as utility companies, in 1932 and in 1937.

Looking at the two groups from the standpoint of electric light and power operations only, it is of interest to note that the utilities' operating ratio before taxes was 42.9 per cent in 1937, compared to 52 per cent for municipal plants. Taxes took $312,271, or 14.2 per cent, of utility gross in 1937, compared to $2,325, or 1½ per cent, for municipals. On a fairly comparable basis, utilities paid in taxes ten times as much as municipal plants.

The second striking comparison appears in the depreciation and retirement picture. In 1932 utilities were setting aside $142,648, or 7.6 per cent, of gross. By 1937 this had increased to $217,656, or 9.85 per cent, of gross. Municipals in 1932 were setting aside $11,400, or 9.35 per cent, of gross, but by 1937 this charge had been dropped to but 7.57 per cent of gross, in complete reversal of utility policy.

ALLOCATION OF REVENUE DOLLAR



PAYROLLS, FUEL, MAINTENANCE

Whole Industry, Private and Municipal

Year	Number of Employees	Thousands of Dollars		
		Salaries and Wages	Fuel Cost	Maintenance
1907	42,066	31,935	23,058	.....
1912..	71,395	55,659	34,877	.....
1917..	94,679	86,473	87,272	.....
1922..	136,105	194,148	162,558	.....
1927..	251,020	367,632	.....	.....
1932..	244,573	323,880	112,323	87,722
1937..	273,491	465,312	180,344	145,932
1938*.	264,000	460,000	165,000	156,000
1939*.	264,000	463,000	184,000	171,000

Source: U. S. Census, Electric Light and Power Industry. * Electrical World estimate.

SUMMARY OF OPERATIONS

Private and Municipal (Millions of Dollars)

	1937	1938	1939
Revenue from Ult. consumers	2,185	2,172	2,304
Other elec. service	181	185	190
Total	2,366	2,357	2,494
Oper. expenses	1,028	1,020	1,025
Taxes	315	328	345

Sources: Ult. consumer rev., E. E. I.; others Elec. World estimates.

OPERATING REVENUE, EXPENDITURES, TAXES

Privately Owned and Municipal Establishments

In Thousands of Dollars

	Privately Owned			Municipal		
	Revenue for Electric Service	Operating Expenditures	Taxes	Revenue for Electric Service	Operating Expenditures	Taxes
1912...	287,139	152,630	13,147	Included in Privately Owned		
1917....	502,060	319,912	30,063	Included in Privately Owned		
1922....	948,905	498,731	73,128	79,875	54,337	644
1927....	1,702,020	756,850	150,253	Data not Requested		
1932....	1,873,364	750,597	203,858	122,539	67,359	1,292
1937....	2,207,109	947,022	312,271	154,976	80,566	2,325
1937*...	2,056,000	795,000	312,000	.....	.....	.....
1938*...	2,050,000	789,000	325,000	.....	.....	.....
1939*...	2,165,000	810,000	345,000	.....	.....	.....

Sources: U. S. Census. * Edison Electric Institute — Preliminary figures, private electric light and power industry, inter-company transactions eliminated.

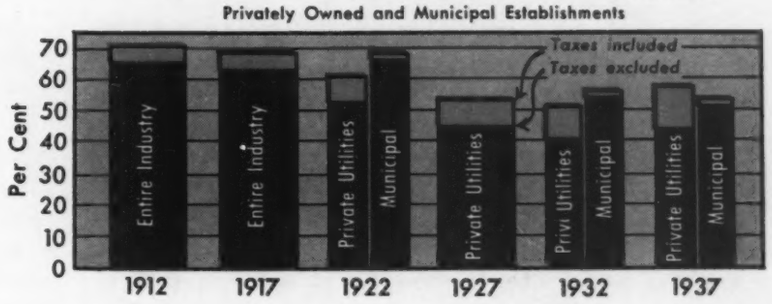
OPERATING RATIO BEFORE AND AFTER TAXES

Private Companies and Municipal Plants

Per Cent	1912	1917	1922	1927	1932	1937
Private Companies						
Before Taxes	65.2	63.5	52.5	44.4	40.2	42.8
After Taxes	70.7	69.7	60.2	52.9	51.1	56.9
Municipal Plants						
Before Taxes	Included with		68.0	.....	55.2	52.0
After Taxes	Private		68.8	.....	56.1	53.5

OPERATING RATIO EXCLUDING AND INCLUDING TAXES

Privately Owned and Municipal Establishments



INCOME AND EXPENDITURES

Private and Municipal Establishments, including associated utilities, in Thousands of Dollars. Source: U. S. Census

	Private Companies		Municipal Plants			Private Companies		Municipal Plants	
	Total, incl., associated utilities	Elec. Light and Power Only	Total, incl., associated utilities	Elec. Light and Power Only		Total, incl., associated utilities	Elec. Light and Power Only	Total, incl., associated utilities	Elec. Light and Power Only
1937					1932				
Operating revenue	2,603,319	2,207,109	168,288	154,976	Operating revenue	2,266,057	1,873,364	132,963	122,539
Operating expenditures	1,205,215	947,022	88,314	80,566	Operating expenditures	976,169	750,597	73,504	67,359
Taxes	359,604	312,271	2,635	2,325	Taxes	243,446	203,858	1,430	1,292
Deprec. or retirement	254,779	217,656	18,897	17,137	Deprec. or retirement	173,608	142,648	12,475	11,400
Net oper. revenue	783,721	730,160	58,442	54,948	Net oper. revenue	872,834	776,261	45,554	42,488
Rent charge or credit	3,637	3,570	165	165	Rent charge or credit	−15,241	−10,828	−26	−34
Total oper. income	787,358	733,730	58,607	55,113	Total oper. income	857,593	765,443	45,528	42,454
Other income	61,973	.....	1,552	.....	Other income	61,060		692	
Gross income	849,331	Not allocated	60,159	Not allocated	Gross income	918,653	Not allocated	46,220	Not allocated
Int., amortization, etc.	335,150		10,978		Int., amortization, etc.	380,037		9,165	
Net income	514,181	.....	49,181	.....	Net income	538,616	.....	37,055	.....

FINANCIAL

Utilities sell just short of billion dollars of securities—SEC considers competitive bidding and raising new capital by the sale of common stock

TOTAL volume of financing by the electric utility industry during 1939 was slightly more than in the preceding year. Money rates hardened a bit, with many factors entering into the price of investor money. Some uncertainty as to the course the Washington government would take and as to its money policies played a part during the first half-year, while in the second the outbreak of war in Europe disrupted financial markets temporarily.

Surprising was the very low volume of new capital raised during the year. Of the $992,346,900 of financing, only $16,219,177 was new money. With the largest plant expansion and construction budget since 1930 planned for 1940, it appears that the utilities will seek a large volume of new money to finance this program. The way has been paved for raising this new capital by the refunding operations during the past few years, the major portion of which seems now completed for many companies.

The trend toward placing issues with institutional investors took a jump upward during the year with a total of $252,625,000 placed, including $114,500,000 of 3¼s of Commonwealth Edison of Chicago, $66,582,000 New York Power & Light 3¾s, $30,000,000 Southern California Edison 3¼s and $22,500,000 Indiana & Michigan Electric 3¼s. It appears that this channel will be used to a greater extent in the future to effect savings on underwriting commissions and filing fees, as well as to prevent delays by the Securities and Exchange Commission.

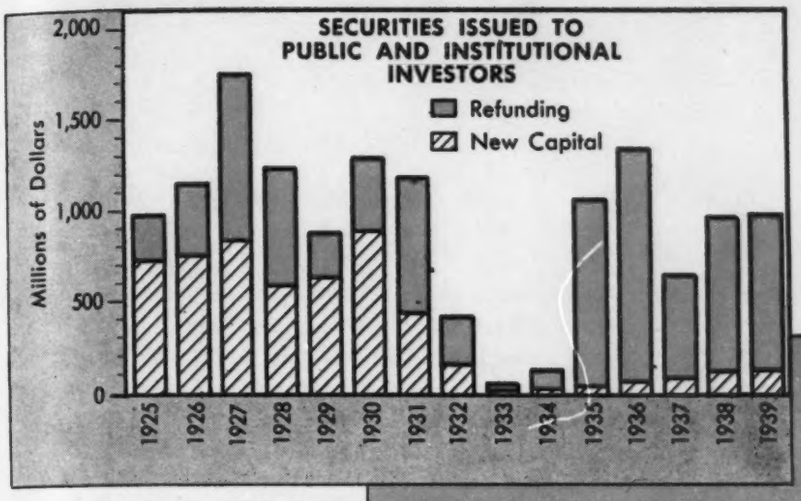
Significant at the year end, after a "hold-up" for more than a month while SEC sought for "arm's-length bargaining" between underwriters and company, Consumers Power was authorized to issue $18,594,000 bonds for refunding and to sell 125,000 shares of common stock at $28.25 a share to Commonwealth & Southern, its parent; but refused authorization of $10,000,000 of bonds to reimburse the treasury for capital expenditures. Great importance was read into this decision since the SEC allowed outside financial firms to intervene in the hearings, considered competitive bidding, and indicated that new capital should be raised by sale of common stock.

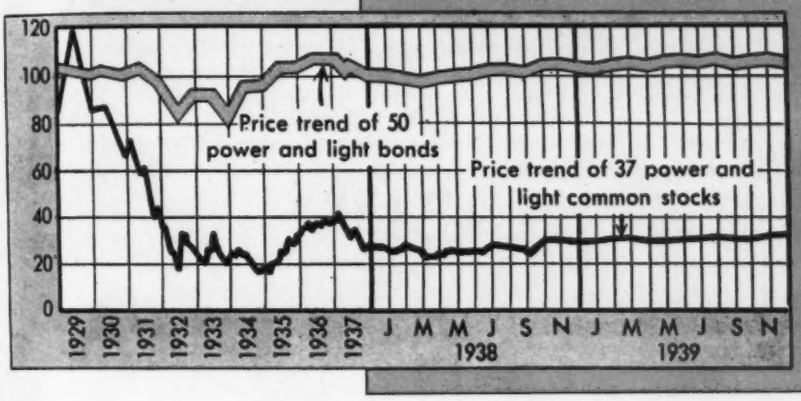
Since SEC is preparing to take up utility integration actively during 1940, the financial markets are likely to be called upon to aid, to a great extent, in financing the sale and purchase of properties and the realignment of systems. There has been some talk of a "super-agency", with RFC taking a part, to facilitate integration.

One of the largest refunding operations during the year was the $123,500,000 by Pennsylvania Power & Light, of which $95,000,000 was in first mortgage bonds and $28,500,000 in debentures. In addition the company borrowed $8,500,000 in 2⅝ ten-year serial notes. North American sold $70,000,000 in debentures and $34,829,000 in 5¼ per cent preferred stock to refund its own debentures and to eliminate its intermediate holding company—North American Edison.

In addition to normal financing, the utilities sold $45,951,000 in notes to finance operating and to aid refunding. This will be repaid out of earnings or refunded along with other permanent financing.

Outlook for new financing during 1940 appears bright, for there is evidence that, barring war or the like, present easy money will continue and there is a growing need for new securities by institutional investors.





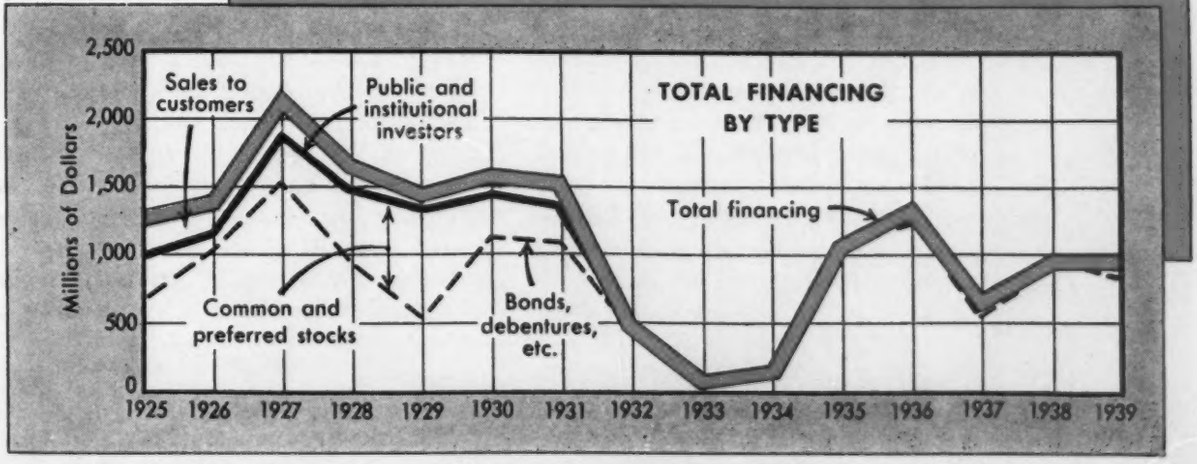
NEW UTILITY FINANCING TOTALS $992,346,900

No. of Issues	Range of Yield	Amount of Issues
Mortgage Bonds (Av. yield 3.38%)		
5	2.76–3.02	$61,223,000
5	3.06–3.16	208,300,000
5	3.20–3.39	161,775,000
8	3.50–3.71	159,532,000
7	3.75–3.96	95,850,000
6	4.00–4.25	16,283,000
5	4.40–5.73	9,634,000
1	.....	2,700,000
42		$715,297,000
Debentures (Av. yield 3.54%)		
10	0.65–4.50	$157,033,300
Notes		
1	3.08%	$500,000
Preferred Stock (Av. yield 4.75%)		
4	4.00–4.90	77,062,000
4	5.50–6.66	42,454,600
8		$119,516,600
Total Financing		$992,346,900
Refunding		976,127,723
New Capital		16,219,177

SECURITY SALES BY CLASSES (in Thousands of Dollars)

Year	Bonds, Debentures, etc., to		Stocks, Common and Pfd.† (3)	Sales to Customers (4)	Total Financing† (5)	Allocation of Public Sales*		
	Private Investors (1)	Institutional Investors (2)				New Capital (6)	Refunding (7)	Total Issues (8)
1926	1,013,160		135,505	246,900	1,395,565	757,870	393,095	1,150,965
1927	1,528,633	Included	360,277	240,000	2,128,909	830,440	913,195	1,743,635
1928	922,098	in	549,399	170,000	1,641,498	599,809	637,412	1,237,220
1929	523,408	Col. 1	792,051	145,000	1,460,459	624,174	257,602	881,776
1930	1,114,636		338,218	135,000	1,587,854	894,473	403,062	1,297,535
1931	1,090,584		258,658	159,000	1,508,242	424,163	758,741	1,182,904
1932	404,840		47,417	18,000	470,257	165,728	239,112	404,840
1933	53,725		2,148	375	56,248	6,813	46,913	53,725
1934	131,175		.....	.....	131,175	2,431	128,744	131,175
1935	957,042	110,629	.....	.....	1,067,671	26,496	1,041,175	1,067,671
1936	1,122,800	156,881	52,259	.....	1,331,940	59,727	1,272,213	1,331,940
1937	522,613	37,604	86,095	.....	646,312	81,984	563,699	645,682
1938	750,549	192,762	20,694	.....	964,005	123,056	840,949	964,005
1939	620,205	252,625	119,517	.....	992,347	16,219	976,128	992,347

† Including rights and warrants. * Not including common stock rights and warrants.



BUDGET

Largest in ten years is the 1940 prospective outlay — Expenditures planned for steam plant rank first in size with distribution a close second

IN 1930 the electric utilities, acceding to the request of the national government to continue new construction expenditures on the scale then established, in an effort to bolster up public confidence after the stock market crash of October, 1929, spent more than $900,000,000 for new plants, the largest amount for any one year in the history of the industry. To find a budget figure to top the expenditure planned for 1940, it is necessary to go back to that banner year. For the three years just past the budget has hovered around $450,000,000; this year the prospective outlay rises above $600,000,000 for the first time since 1930.

Totaling the annual expenditures for new construction in the various parts of the system, for the periods 1921–1930 and 1931–1940 as in the table opposite, one finds that their proportions in the grand totals of the two decades were different. For instance, such comparison establishes the truth of the general impression that in the '20s a smaller proportion of construction expenditure was for distribution than in the '30s, and that a larger proportion went for plant capacity in the earlier decade. Any one who cares to add the figures will discover about 26 per cent of construction money spent for distribution in the '20s and about 43 per cent in the '30s. In the earlier period about 32 per cent was laid out in plant capacity (steam and hydro) and in the latter only 27 per cent. But, and this point is significant, the decrease in proportionate capacity expenditure occurs entirely in hydro plant construction. In other words, the utilities spent as much, proportionately, for steam plant in the '30s as they did in the '20s.

As to planned expenditure for steam plant capacity, 1940 is exceeded by only one other year in electric utility history. The exception is 1924, when about $270,000,000 was spent for steam plant. Only one other year even closely approaches 1940 in this respect, 1923, with an expenditure of about $210,000,000.

Analyzing the 1940 prospective expenditure in the same way as for the ten-year periods discloses that this year departs considerably from the averages of the years 1931–1940. The proportion of money going to steam plant construction is greatly increased, to hydro even more reduced than from the '20s to the '30s and to transmission, substations and distribution slightly down from the period average, although the money total for all three in 1940 is above 1939 and above the average for 1939, '38 and '37.

Of the three last-named divisions the greatest increase from last year occurs in transmission, a condition to be expected, since transmission is so closely associated with generating plant. There was some fear expressed in manufacturing circles that because of the heavy commitments for generating capacity less money would be available for distribution construction. This is not the case. Actually the figures show that more money will be spent on distribution in 1940 than in any year since 1930. Since the tabulated data include no figures on federal undertakings—only private and municipal operations—it is to be expected that the volume of business in distribution materials and equipments will be considerably larger than indicated by the figure in the table. Also, it is to be remembered that distribution construction is closer to load growth in point of time than is generating capacity. This fact has caused distribution expenditure estimates to be exceeded in years past and may do so again in 1940.

In summary, it may be said that the prospective outlay for 1940 reflects the confidence in their industry felt by electric utility executives and investors. The amount of money estimated for new construction, the largest in ten years, announces the determination of the industry to remain what it always has been, amply prepared for any demand of increased business or of national defense that may be made upon it.

CAPITAL EXPENDITURES

Electric Light and Power Industry

1938 Expenditures	
Generating stations	$150,600,000
Transmission, distribution, substations	297,400,000
Miscellaneous	34,000,000
Total	$482,000,000
1939 Expenditures (preliminary)	
Generating stations	$119,400,000
Transmission, distribution, substations	287,750,000
Miscellaneous	22,850,000
Total	$430,000,000
1940 Expenditures (prospective)	
Generating stations	$246,100,000
Transmission, distribution, substations	327,300,000
Miscellaneous	31,600,000
Total	$605,000,000

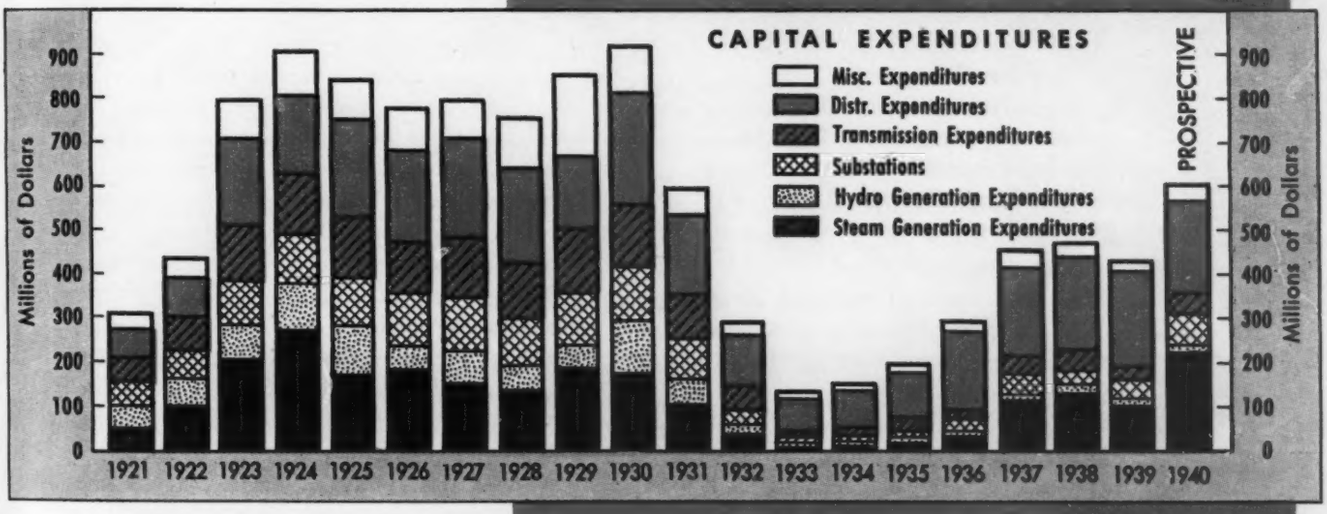
CAPITAL EXPENDITURES, 1939, BY REGIONS

(In thousands of dollars)

Region	Steam	Hydro	Transmission	Substations	Distribution	Miscellaneous	Total
Eastern	26,900	2,700	12,900	5,250	65,600	6,550	119,900
Central	37,700	1,500	16,000	11,500	55,700	9,300	131,700
Southern	27,200	3,000	7,200	7,100	[illegible]000	3,700	105,200
Western	9,700	10,700	9,400	7,900	32,200	3,300	73,200
Total	101,500	17,900	45,500	31,750	210,500	22,850	430,000

PROSPECTIVE CAPITAL EXPENDITURES, 1940

Eastern	75,000	2,000	24,000	7,500	69,500	11,500	189,500
Central	90,500	1,500	18,000	15,100	65,000	9,600	199,700
Southern	46,300	3,000	14,500	9,000	61,000	6,700	140,500
Western	19,500	8,300	11,000	7,700	25,000	3,800	75,300
Total	231,300	14,800	67,500	39,300	220,500	31,600	605,000



ANNUAL CAPITAL EXPENDITURES FOR NEW CONSTRUCTION

Electric Light and Power Industry
(In Thousands of Dollars)

	Steam	Hydro	Transmission	Substations	Distribution	Miscellaneous	Total
1921	49,858	52,816	60,657	52,000	59,077	35,000	309,908
1922	100,543	63,790	75,588	65,000	84,095	49,000	438,016
1923	209,417	74,396	125,200	105,000	193,130	88,000	795,143
1924	269,700	109,540	134,190	114,000	179,010	101,000	907,440
1925	175,000	106,000	135,000	115,000	221,000	94,000	846,000
1926	189,000	47,000	116,000	121,000	206,000	93,000	772,000
1927	156,000	69,000	141,000	119,000	220,000	89,000	794,000
1928	137,000	56,000	125,000	107,000	212,000	117,000	754,000
1929	188,000	51,000	145,000	120,000	261,000	88,000	853,000
1930	176,496	117,565	139,533	123,482	258,699	103,642	919,417
1931	104,386	60,317	101,031	87,564	182,158	61,284	596,740
1932	40,000	20,000	60,000	30,000	110,000	25,000	285,000
1933	10,400	4,000	16,100	14,900	72,200	11,700	129,300
1934	10,258	5,704	30,180	11,921	76,299	13,292	147,654
1935	16,172	6,337	35,349	14,766	103,104	17,127	192,855
1936	36,820	9,030	45,220	20,170	174,640	24,000	289,710
1937	94,870	13,025	80,030	40,740	203,250	34,055	455,480
1938	133,000	17,600	36,000	46,400	215,000	34,000	482,000
1939*	101,500	17,900	45,500	31,750	210,500	22,850	430,000
1940†	231,300	14,800	67,500	39,300	220,500	31,600	605,000

* Preliminary. † Prospective.

ELECTRICAL MANUFACTURING

Production up 25 per cent but still below year 1937 — Bare possibility that 1940 may outstrip all previous years

PRODUCTION of electrical apparatus, supplies and appliances was some 25 per cent better in 1939 than it was in 1938, reaching a total on the basis of Census figures of $1,448,000,000. This figure has been exceeded only twice before, namely, 1937 and 1929.

Add to these figures the output of refrigerators, radio, turbines, electrical porcelain, glass insulators and washing machines, which are not included in the Census under the heading of electrical manufactures, and the total for 1939 was $2,143,000,000.

Production in the first half of the year was low; in the second half, and particularly after Labor Day, almost all electrical manufacturers were busy. During the last few weeks of the year sales began to flatten out. The backlog at the start of the new year, however, will be larger than any year since January 1, 1937.

While the year's operations will not equal those for 1937, they closed better and on an upward trend. This trend, however, was modest, which would lead one to suspect that 1940 would not show any spectacular rise, but should in the end bulk considerably more than 1937, and might, especially if appliances go well, even exceed 1929.

It is interesting to note by way of comparison that electrical manufacturing was in step with general business improvement. The Federal Reserve Board index was up 23 per cent and electrical manufacturing index as developed by NEMA was up 25.8 per cent.

Employment, on the other hand, did not increase as rapidly as did production. Some of that may have been due to the fact that appliance production was back on the 1936 level.

Major appliances, including refrigerators, appear to be going through a cycle of less spectacular sales, nor was there anything at the end of the year to indicate anything different for 1940.

Motors and generators, industrial materials and transmission and distribution equipment, on the other hand, gave evidence at the end of the year of a better start for the new year than either of the previous two years. This is somewhat confirmed by the increased utility construction budget for 1940, the largest in ten years.

To some degree these figures, being dollar volume, do not exactly reflect the situation. There were some price adjustments last year, generally for the purpose of bringing prices back in line with cost. The price advances, however, were probably less than during any previous period of rapid expansion.

Exports did not begin to show strength until October, when they suddenly jumped up, reflecting the unstable mental attitude of domestic buyers during September. Although channels of trade have been disrupted by the war, there are many other reasons why one cannot be too optimistic about foreign trade for some time.

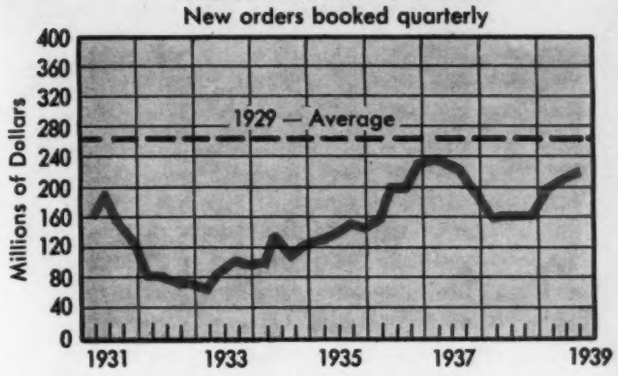
The manufacturing situation for next year can change at any moment from one of comfortable improvement to a repetition of early 1937, depending upon customer delivery requirements and the possibility of government priority orders. So far there has been little war buying either by belligerents or by this country. That situation can change at any time and carry other businesses along with it.

At this point 1940 looks like a better year by at least 10 per cent. It has potentialities of going much higher and, by the same token, considering the possibility of peace, may go off.

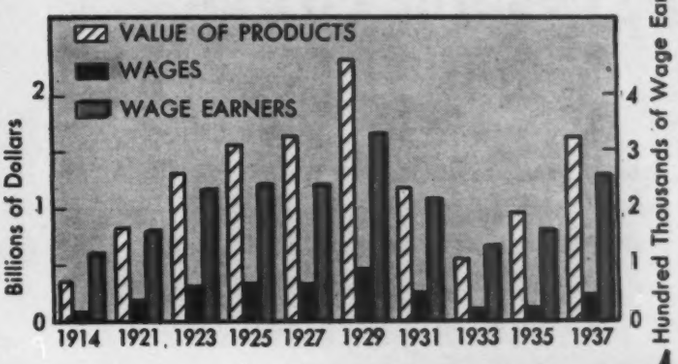
The one barrier to very large production will be skilled mechanics. There is still room for expansion with today's labor supply, but not a whole lot in a number of operations. If priorities are imposed, this may prove to be a somewhat troublesome situation.

ELECTRICAL GOODS

New orders booked quarterly



ELECTRICAL MANUFACTURING

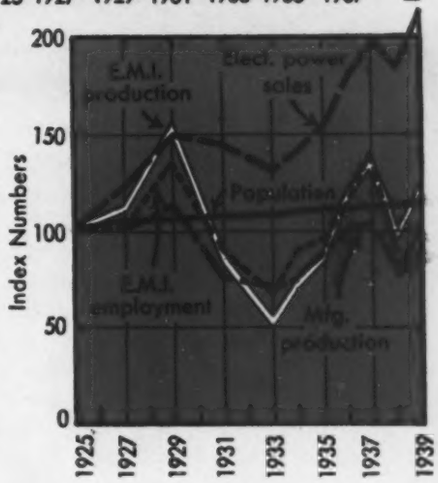


ELECTRICAL MANUFACTURING INDUSTRY AND RELATED FACTORS, 1925-1939

Index Numbers 1925 = 100

	1925	1927	1929	1931	1933	1934	1935	1936	1937	1938	1939†
1. E. M. I. production	100	112	156	85	51	70	85	119	137	97	123
2. E. M. I. employment	100	101	137	90	68	88	94	106	128	77	89
3. F. R. B. production	100	102	114	78	73	76	87	101	106	82	101
4. Sales of electricity	100	122	150	144	131	141	155	180	199	188	214
5. Population	100	103	106	108	109	110	111	112	113	113	114

Source, N.E.M.A. † 1939 figures estimated by N.E.M.A. statistical department.



NOTES

1. E.M.I. PRODUCTION based on U. S. Census of Manufactures and data compiled by N.E.M.A. statistical department. In addition to products shown in electrical machinery apparatus and supplies schedule of the Census are included electric refrigeration, radio apparatus and supplies, steam turbines for electrical drive — other than marine, electrical porcelain, glass insulators and electric washing machines.

2. E.M.I. EMPLOYMENT based on labor series of National Industrial Conference Board, but adjusted to 1925 = 100. This series represents the electrical manufacturing industry including radio.

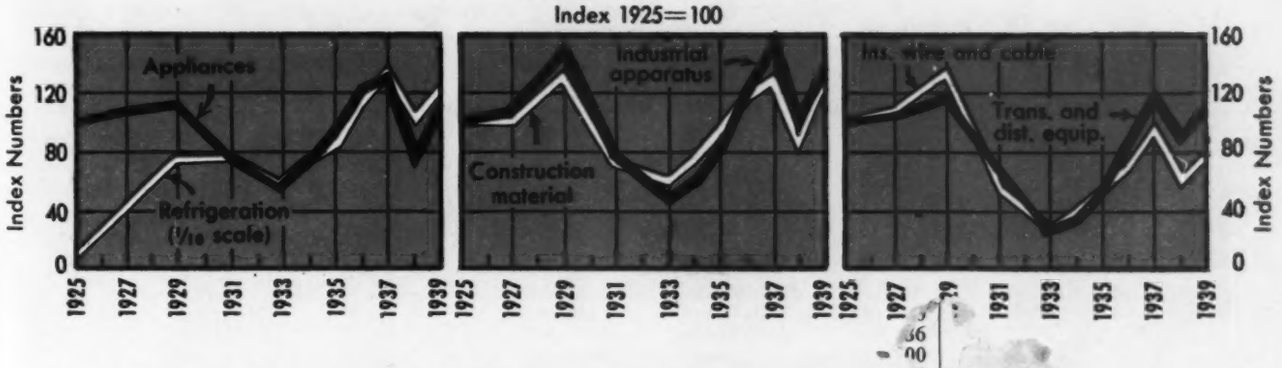
3. F.R.B. PRODUCTION based on the Federal Reserve Board's index for the manufacturing industry and adjusted to 1925 = 100.

4. ELECTRIC POWER SALES index figures for 1927–1937 based upon Edison Electric Institute data. 1925 and 1937 have been estimated by the N.E.M.A. statistical department.

5. POPULATION based upon the annual midyear estimates of the U. S. Bureau of the Census.

MANUFACTURERS' SALES

Index 1925=100



SOME MAJOR BRANCHES OF THE ELECTRICAL MANUFACTURING INDUSTRY, 1925-1939

Index Numbers 1925 = 100

	Manufacturers' Sales	1925	1927	1929	1931	1933	1934	1935	1936	1937	1938	1939†
1. Appliances	100 = $140,000,000	100	106	110	72	57	73	92	121	132	104	120
2. Refrigeration	100 = 16,000,000	100	425	766	778	574	747	844	1,131	1,360	769	1,094
3. Electrical material	100 = 38,000,000	100	100	135	71	59	74	93	116	131	83	122
4. Industrial apparatus	100 = 132,000,000	100	105	149	75	47	59	83	118	161	97	127
5. Trans. and dist. equip.	100 = 167,000,000	100	106	120	64	22	33	50	83	124	90	110
6. Ins. wire and cable	100 = 110,000,000	100	106	133	54	27	36	46	69	98	60	79

Source, N.E.M.A. † 1939 figures estimated by N.E.M.A. statistical department.

1. APPLIANCES include domestic kitchen and table appliances, electric ranges, electric water heaters, electric vacuum cleaners, electric washing machines, electric fans and food service equipment.

2. HOUSEHOLD REFRIGERATION includes complete units, parts and cabinets. Commercial refrigeration equipment and air-conditioning equipment are excluded. These index figures appear unusually large because the household refrigeration industry was just beginning about 1925 and therefore the base figure is small.

3. ELECTRICAL MATERIAL includes carbon, electrical porcelain, laminated phenolic products, manufactured electrical mica and vulcanized fiber. Molded insulation is excluded.

4. INDUSTRIAL APPARATUS includes electric welding equipment and wire, industrial controls, industrial heating equipment and motors and generators (excluding all generators except motor-generator sets). Electric furnaces and electric tools are excluded.

5. TRANSMISSION AND DISTRIBUTION EQUIPMENT includes switchgear, capacitors, feeder voltage regulators, high-voltage insulators, power and distribution transformers, lightning arresters pole line hardware and earth anchors, panelboards and distribution boards, small air circuit breakers and electrical measuring instruments.

6. INSULATED WIRE AND CABLE for light and power includes wire and cable of various types of insulation such as paper, rubber, varnished cambric and weatherproof used primarily for lighting and power circuits and lines. Bare wire is excluded.

All indices based upon U. S. Census of Manufactures data and N.E.M.A. statistical department data corrected where possible to represent the entire industry.

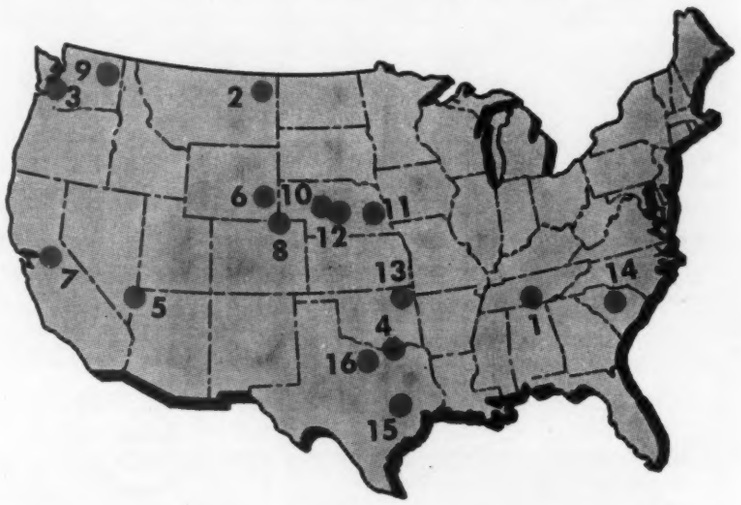
FEDERAL POWER PROJECTS

Energy becoming available from developments which are wholly or partially completed introduces a new set of problems

EVENTS in the past year indicate an ebbing of the high excitement that characterized the starting and the first years of the government water power program. Some projects are built and others are nearly finished and the difficult problems of disposal of the energy thus made available are coming to the fore. Several sales of privately owned utility property to federal hydro systems or cities associated with them did much to clear the air. The most important of these were Tennessee Electric Power and Memphis Power & Light.

At the same time there was a marked shift to private distribution of federal water power as markets failed to show up. Contracts were made in Georgia, Alabama, Texas, Nebraska and Oregon. The two Nebraska contracts represented a reversal from absorption of private utilities by the state-wide public ownership system.

Local enthusiasm for the federal projects shows indication of being on the wane. Oklahoma is protesting in the courts against the flooding of agricultural lands proposed by the Denison project. Citizens and state and local governments are worrying about the loss of tax revenue from properties taken over by TVA-supplied systems. Altogether, it looks as though the uncritical, expansive days are past for federal water-power development.



	Project	Est. Cost ($1,000)	Ultimate Capacity (Kw.)	Added in 1939 (Kw.)	In Operation End of 1939 (Kw.)	Expected to be Added in 1940 (Kw.)	Approx. % Completed End 1939
1	TVA (A)						
	Gilbertsville...	95,000 (B)	160,000	.....	.....	.....	3
	Pickwick.....	31,837 (C)	216,000	72,000	72,000	.....	100
	Wilson.....	34,989 (D)	444,000	.....	184,000	.....	100
	Wheeler.....	31,586 (C)	259,200	.....	64,800	.....	100
	Guntersville...	33,400 (E)	97,200	72,900	72,900	.....	100
	Chickamauga..	37,000 (E)	108,000	.....	.....	81,000	95
	Watts Bar....	35,000 (E)	150,000	.....	.....	.....	3
	Norris.....	30,749 (F)	100,800	.....	100,800	.....	100
	Hiwassee.....	20,000 (G)	115,200	.....	.....	57,600	74
	Corps of Engineers						
2	Fort Peck.....	123,750 (H)	105,000	.....	.....	.....	90
3	Bonneville.....	78,120 (H)	518,400	86,400	86,400	108,000	100
4	Denison.....	48,290 (H)	125,000	.....	.....	.....	1
	Reclamation Bureau						
5	Boulder Dam.....	132,160 (I)	1,317,000	165,000	700,000	.....	100
6	Kendrick.....	20,000 (J)	32,400	32,400	32,400	.....	100
7	Central Valley.....	170,000 (K)	375,000	.....	.....	.....	35
8	Colorado Big Thompson..	44,000 (L)	145,000	.....	.....	.....	30
9	Grand Coulee.....	394,500 (M)	1,944,000	.....	.....	.....	35
	PWA Projects						
10	Platte River.....	11,226	26,000	26,000	26,000	.....	100
11	Loup River.....	12,814	47,000	.....	45,225	.....	95
12	Central Nebraska..	35,516	54,000	.....	.....	54,000	80
13	Grand River.....	20,000	86,400	.....	.....	57,600	80
14	Santee-Cooper.....	34,300 (N)	163,000	.....	.....	.....	20
15	Lower Colorado River Auth.....	22,350 (O)	98,000	33,750	33,750	53,250	80
16	Brazos.....	50,000 (P)	75,000	.....	.....	22,500	86
	Totals.....	1,546,587	6,761,600	488,450	1,418,275	438,950	

Notes

(A) TVA joint investment, covers navigation, flood control, power.
(B) Estimate with no power.
(C) Estimate includes 2 units.
(D) Reconstruction cost of facilities acquired from War Department, plus additions made by authority to June 30, 1938.
(E) Estimate includes 3 units.
(F) Costs to June 30, 1938.
(G) Estimate includes one unit.
(H) Bonneville-Navigation $4[illegible] 000, power house and generating facilities $35,520,000. Fort Peck-Navigation $117,000,000, power $6,750,000. Denison-Allocation as between power and flood control not yet determined.
(I) *Not* including all-American Canal.
(J) Includes Alcova Dam and irrigation district.
(K) Includes whole project; Shasta Dam alone will have power development.
(L) Including $26,000,000 for irrigation.
(M) For dam and irrigation development.
(N) Total estimated cost exclusive of $5,495,691 by WPA for clearing reservoir.
(O) Total exclusive of $18,280,000 allotment to Bureau of Reclamation and direct Congressional authorization and $109,850 WPA.
(P) Possum Kingdom dam, key project in the contemplated $50,000,000 development of the Brazos River Conservation and Reclamation District, has received a $4,200,000 WPA allotment, a substantial portion of which has been expended. Recently RFC purchased $4,200,000 of the district's bonds, of which proceeds approximately $2,500,000 will be used to complete Possum Kingdom. An estimated 75,000 kw. will be generated in the proposed 7-dam hydro development. The RFC bonds will be retired from sale of power supplemented by a state appropriation of $132,000 per year for sixteen years.

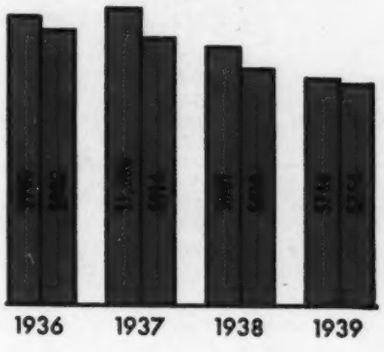
REA OPERATIONS

More than a quarter of a billion dollars has been allotted in 4½ years — 180,000 miles of line built — 400,000 consumers being served

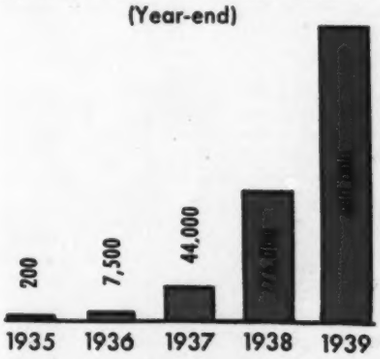
IN THE four and a fraction years since its creation as an independent agency, in May, 1935, the Rural Electrification Administration has become an important element in the providing of electric service on farms and in rural communities. Through the 180,000 miles of line built in that period it has made the conveniences of electricity available to some 400,000 consumers; of the aggregate of $274,165,128 of available funds it has made allotments of $267,320,793 to 687 systems, of which 488 have been energized.

The advancing stride is further shown by the allotments made in eleven months of 1939, as given in the tables by states—$87,000,000 to 169 borrowers, compared with the totals of $180,660,210 and 518, respectively, at the end of 1938.

AVERAGE COST PER MILE
(Half-yearly)



NUMBER OF REA CONSUMERS
(Year-end)



AVAILABLE FUNDS AND ALLOTMENTS

Fiscal Year	Amount of Funds Available, by Fiscal Years	Allotments as of Nov. 30, 1939
1936	$14,165,128*	$14,165,128*
1937	50,000,000*	46,190,643*
1938	30,000,000	29,488,086
1939	140,000,000	139,508,556
1940	40,000,000	37,783,880

* No additional allotments may be made from the 1936 or 1937 funds.

RURAL ELECTRIFICATION ADMINISTRATION
Allotments by States
January 1, 1939 and December 1, 1939
and Number of Energized Systems

State	Totals as of Jan. 1, 1939		Totals as of Dec. 1, 1939		Energized Systems as of Dec. 1, 1939
	Borrowers	Allotments	Borrowers	Allotments	
United States	**518**	**$180,660,210**	**687**	**$267,320,793**	**488**
Alabama	11	3,579,350	15	5,458,550	11
Arizona	2	178,000	3	703,000	1
Arkansas	12	3,083,000	13	5,608,500	10
California	3	1,510,500	4	1,748,500	3
Colorado	6	1,632,500	11	3,402,500	5
Connecticut	1	92,000	0	0	0
Delaware	1	736,037	1	878,000	1
Florida	5	818,000	7	1,667,000	5
Georgia	35	10,791,015	36	13,864,615	34
Idaho	5	1,796,750	7	2,545,750	4
Illinois	18	9,540,630	27	14,947,130	14
Indiana	31	11,433,195	43	17,020,195	31
Iowa	39	12,310,128	50	17,800,628	37
Kansas	12	3,560,651	20	5,761,151	9
Kentucky	22	6,147,900	24	8,658,720	23
Louisiana	6	1,550,100	11	2,824,600	6
Maine	1	91,000	2	223,000	1
Maryland	1	305,500	2	705,000	1
Massachusetts	0	0	0	0	0
Michigan	14	10,596,000	14	11,252 500	14
Minnesota	31	12,962,736	39	18,127,236	30
Mississippi	19	4,788,700	22	7,721,700	19
Missouri	20	7,145,700	30	11,568,700	15
Montana	10	1,602,600	11	2,393,100	10
Nebraska	25	9,405,200	28	10,670,700	16
Nevada	1	173,000	1	227,000	1
New Hampshire	0	0	1	382,000	0
New Jersey	2	420,300	2	420,300	2
New Mexico	3	653,000	3	710,000	2
New York	1	750,000	1	1,375,000	1
North Carolina	11	2,488,350	22	6,219,350	16
North Dakota	3	986,972	7	1,988,972	3
Ohio	25	12,815,025	26	14,344,025	25
Oklahoma	9	3,516,500	18	6,529,000	13
Oregon	5	652,000	6	1,002,500	4
Pennsylvania	7	4,486,200	13	7,222,200	7
Rhode Island	0	0	0	0	0
South Carolina	4	1,576,328	12	4,048,328	3
South Dakota	3	587,000	7	1,738,500	3
Tennessee	12	3,555,058	17	8,695,058	12
Texas	43	13,399,185	59	20,306,685	42
Utah	3	264,000	3	579,000	1
Vermont	1	72,000	2	280,500	1
Virginia	12	4,475,800	14	6,356,800	12
Washington	8	1,686,700	13	3,644,200	7
West Virginia	2	548,000	2	582,000	2
Wisconsin	25	10,139,800	28	13,398,800	25
Wyoming	7	1,257,800	10	1,719,800	6
Puerto Rico	1	500,000	0	0	0

OUTSTANDING FACTS

A perspective on the recent history of the light and power industry in a summary of significant data on the operations and status of the electric utilities up to this year

	1930	1932	1934	1935	1936	1937	1938	1939*
FIXED CAPITAL ($1,000)	11,800,000	12,660,000	12,660,000	12,660,000	12,660,000	12,660,000	12,780,000	12,790,000
Securities issued ($1,000) [3]	1,587,853	470,257	131,175	1,067,671	1,331,940	646,312	964,006	992,347
Securities ex w. & r. ($1,000) [2]	1,297,535	404,840	131,175	1,067,671	1,331,940	645,682	964,006	992,347
New cap. ($1,000)	894,473	165,728	2,431	26,496	59,727	81,983	123,056	16,219
Refunding ($1,000)	403,062	239,112	128,744	1,041,175	1,272,213	563,698	840,949	976,128
REVENUE elec. serv. ($1,000)	2,151,150	1,961,111	1,975,285	2,064,753	2,208,087	[5] 2,218,702	[5] 2,198,715	[5] 2,330,000
From ult. consumers ($1,000)	1,990,955	1,813,717	1,831,871	1,911,989	2,044,587	2,184,743	2,172,239	2,304,000
Farm ($1,000)	46,690	47,128	49,183	48,405	59,286	67,947	75,946	94,000
Residential ($1,000)	642,276	640,385	648,802	673,526	696,997	740,219	778,003	802,800
Small lt. and pwr. ($1,000)	575,598	500,993	490,420	519,213	562,122	604,848	609,281	640,800
Large pwr. and lt. ($1,000)	566,468	474,425	499,452	531,107	581,149	615,049	545,947	600,300
Other consumers ($1,000)	159,922	150,786	144,013	139,737	145,032	156,680	163,063	166,100
Other sources ($1,000)	160,195	147,394	143,414	152,764	163,500	[5] 33,958	[5] 26,475	[5] 26,000
EXPENDITURES								
Additions, extensions ($1,000)	960,890	285,000	147,654	192,855	289,710	455,480	430,000	605,000
Operating, total ($1,000)	946,180	817,950	857,200	867,450	963,087	1,027,588	1,020,000	1,025,000
Salaries and wages ($1,000)	423,000	323,880	316,000	330,000	360,000	465,312	460,000	463,000
PRIVATE COMPANIES								
Oper. Revenue [1] ($1,000)	.....	1,719,000	1,736,000	1,813,000	1,941,000	2,055,000	2,050,000	2,165,000
Oper. exp.[1] ($1,000)	.....	602,000	623,000	669,000	725,000	795,000	789,000	810,000
Taxes ($1,000)	.....	205,000	243,000	255,000	286,000	312,000	325,000	345,000
ENERGY (1,000,000 kw.hr.)								
Generated	88,592	76,714	84,986	92,612	106,566	115,166	109,691	123,000
From fuel	59,387	45,913	53,917	56,068	69,336	74,206	68,765	83,600
From water power	29,205	30,801	31,069	36,544	37,230	40,960	40,925	39,400
Total, incl. imported and purch.	91,957	79,692	88,353	95,864	109,685	119,810	114,647	128,320
RATINGS								
Generator rating (kw.)	32,049,919	33,864,072	33,524,471	33,888,305	34,260,071	34,960,321	36,330,380	37,466,200
Steam (kw.)	23,427,058	24,358,777	23,780,148	23,989,227	24,106,618	24,637,926	25,899,534	26,731,400
Water power (kw.)	8,046,732	8,922,969	9,140,690	9,288,537	9,538,640	9,634,014	9,663,929	9,934,900
Int. combust. eng. (kw.)	416,129	582,326	603,633	610,541	614,813	688,381	766,917	799,900
FUEL CONSUMPTION [4]								
Coal and coke (1,000 short tons)	42,910	30,296	33,561	34,164	42,025	44,766	40,212	44,340
Oil (1,000 bbl.)	9,263	7,967	10,391	11,378	14,119	14,143	13,077	16,440
Gas (billion cu. ft.)	120	108	128	125	156	171	171	189
ENERGY SALES								
Ult. consumers (mil. kw.-hr.)	74,906	63,711	71,082	77,596	90,044	99,446	93,894	107,000
Farm	1,789	1,579	1,857	1,692	2,138	2,389	2,528	3,320
Residential	10,703	11,494	12,233	13,496	14,992	16,875	18,461	19,820
Small light and power	13,944	12,106	12,278	13,588	15,612	17,558	18,316	19,900
Large power and light	40,148	30,964	36,944	40,865	48,655	53,546	44,900	53,400
Other	8,322	7,568	7,770	7,955	8,647	9,178	9,689	10,560
CUSTOMERS								
Total number (1,000)	24,556	23,878	24,663	25,313	26,206	27,164	27,851	28,750
Farm	650	709	744	789	1,043	1,242	1,407	1,786
Residential	19,880	19,140	19,866	20,446	20,988	21,698	22,110	22,665
Small light and power	3,626	3,604	3,670	3,711	3,825	3,892	3,979	4,013
Large power and light	347	371	324	305	280	260	252	178
Other	53	54	59	62	70	72	103	108
People in electric lighted homes	83,400,000	82,500,000	84,500,000	87,000,000	90,000,000	91,000,000	97,000,000	100,000,000
Per cent of total population	68.2	67.0	67.1	68.5	70.3	71.0	72.5	75.0
EMPLOYEES, total	298,000	244,573	247,000	248,000	268,000	273,491	264,000	264,000

* Estimated, generally on ten months' operations.
[1] Intercompany transactions eliminated.
[2] Does not include warrants and rights.
[3] Includes warrants and rights.
[4] Includes other electric, in addition to light and power.
[5] Not comparable with years prior to 1937.

CHRONOLOGY OF 1939

JANUARY

FPC approves temporary wholesale power rate schedule for Bonneville.

Cleveland voters authorize $3,000,000 mortgage revenue bonds for new 37,500-kw. unit.

Memphis makes new offer for purchase of Memphis Power & Light properties.

Wisconsin Public Service Corp. opens new hydro plant at Grandfather Falls.

Public Service Corp. of New Jersey announces $23,500,000 building program.

Senator Pope of Idaho appointed member of TVA to succeed A. E. Morgan, former chairman.

Cascade Locks, Ore., signs first Bonneville contract.

Pacific Gas & Electric Co. completes simplification plan.

New England fights government power and flood-control plan; Gov. Aiken leads in defense against attack on states' rights.

A.I.E.E. meets in New York. Jackson gets Edison Medal.

Iowa-Nebraska Light & Power Co. withdraws from agreement with Nebraska public power districts for sale of properties.

Consumers Power Co. announces $16,000,000 construction program.

Lower Colorado River Authority buys Texas Power & Light system in sixteen counties.

FEBRUARY

Supreme Court dismisses suit brought by fourteen utilities to test constitutionality of power program of TVA.

North American Co. stockholders approve refunding plan.

"Little TVA" proposed for Arkansas.

N.E.M.A. meets in New York.

Columbia Gas & Electric Corp. files plan of integration.

TVA-Tennessee Electric Power deal agreed. Agency to pay $80,000,000 for properties.

Ross reveals plans for Northwest Grid.

Golden Gate International Exposition opens.

Memphis Power & Light Co. closes deal to sell electric and gas properties to city and TVA.

Duquesne Light Co. places 80,000-hp. turbo-generator in service at Reed station.

F. M. Farmer nominated for A.I.E.E. presidency.

Nation observes Edison birthday.

Southern California Edison construction budget totals $7,500,000.

Hopkins hails government-utility peace in maiden speech as Secretary of Commerce.

MARCH

Public Service Co. of New Hampshire puts new 20,000-kw. unit on the line.

Potomac Electric Power Co. announces $10,300,000 budget.

Hagenah puts Standard Gas budget at $22,396,320.

Philadelphia Electric Co. and Consolidated Edison of New York order new turbines.

United Light & Power Co. budgets construction expenditures at $15,613,417.

Tidd announces $25,000,000 construction program to American Gas & Electric Co. stockholders.

National Resources Committee makes report to President Roosevelt.

Consolidated Edison Co. of New York launches largest co-operative refrigerator campaign yet attempted by the industry.

James D. Ross, Bonneville Administrator, dies.

Edison Electric Institute sales conference held in Chicago.

Carlisle tells Consolidated Edison stockholders curb on capital markets is retarding recovery.

Pacific Gas & Electric Co. adds 40,000-kw. unit at Oakland plant.

New York State Chamber of Commerce recommends abolishing of New York State Power Authority.

Representative Rankin introduces bill providing for creation of a $100,000,000 Niagara River Authority.

REA makes arrangements with electric meter manufacturers for a new group purchasing plan.

APRIL

Kellogg attacks FPC report, showing comparative rates, taxes and consumer savings of publicly and privately owned electric utilities.

Special joint Congressional committee, appointed last year to investigate TVA, makes report to Congress. Majority report upholds agency, minority critical.

Groesbeck recommends to Electric Bond & Share stockholders co-ordinated use of facilities of private utility companies and federally financed power projects.

Cities Service Co. moves to segregate units.

Commonwealth Edison Co. announces

plans for 105,000-kw. addition at Powerton station and 90,000-kw. addition at Northwestern station.

At dinner of American Conference on National Defense in New York, Assistant Secretary of War Johnson states electric utility industry has ready to install immediately or on order 900,000 kw.

SEC orders probe of Union Electric Co. of Missouri.

Vermont kills municipal ownership bills.

U. S. Supreme Court upholds "Fair Value" doctrine. Decision given in Edison Light & Power Co. of York case.

Associated Gas budget tops 1938 expenditures.

REA allots $1,000,000 for steam plant for co-operative in Wisconsin.

Wakelee elected president of Public Service Corp. of New Jersey; McCarter becomes board chairman.

Tennessee Taxpayers Association expresses misgivings on loss of taxes to states in TVA area.

World's Fair opens in New York.

MAY

Frank P. Walsh, chairman of New York State Power Authority, dies.

TVA-Tennessee Electric Power Co. contract signed. Memphis Power & Light Co. also signs contract.

Union Electric Co. officers resign; new officers named.

N.E.M.A. holds Hot Springs convention.

Changes recommended in National Electrical Code at N.F.P.A. meeting in Chicago.

Kellogg chosen to head E.E.I. as first paid president.

Jerome N. Frank elected SEC chairman.

New York State Power Authority recommends co-ordination of St. Lawrence-Niagara power developments in annual report to Governor Lehman.

Georgia Legislature passes bills, taxing TVA same as private utilities.

San Francisco defeats proposal to put city in utility business.

JUNE

Kellogg inaugurated as president at E.E.I. convention in New York.

Healy of SEC tells Harvard Business School at Boston that utility arrearages of preferred dividends block entry into equity market. Kellogg takes issue.

Federal Power Commission issues report on 385 private utilities.

Dr. Bonbright elected chairman of New York State Power Authority to succeed late Frank P. Walsh.

A.I.E.E. holds Pacific Coast convention. Savage gets Lamme medal.

President Roosevelt nominates John M. Carmody as Administrator of the new Federal Works Agency.

Central Illinois Public Service Co. starts work on new 25,000 kw. station near Hutsonville.

JULY

Pennsylvania Power Co. dedicates new steam plant at New Castle.

Clyde Seavey elected chairman of Federal Power Commission.

Griffith offers Portland General Electric lines for Bonneville power.

Public Service Electric & Gas Co. starts expansion at Burlington, N. J., station.

Two Texas utilities sign LCRA power contracts.

FPC claims jurisdiction over intrastate utility; New Jersey Power & Light Co. charged with violating Federal Power Act.

AUGUST

Associated Gas & Electric Co. proposes sale of Southern group.

Cascade Locks, Ore., buys county electric distribution system of West Coast Power Co.

Protracted drought results in heavy utilization of steam-generating facilities by both public utility and industrial plants.

Sale of utility properties in TVA area completed at $78,600,000.

Dr. Morgan loses in federal court suit challenging the right of President Roosevelt to remove him as chairman of TVA.

TVA enters agreement with Commonwealth & Southern Corp. for sale of power to its southeastern subsidiaries.

Raver named Bonneville administrator.

New trends in lighting discussed at I.E.S. meeting in San Francisco.

SEPTEMBER

Government makes plans for mobilization of power resources as war breaks out in Europe.

Public Service Co. of Indiana announced plans for new 50,000-kw. steam unit at Dresser.

REA orders new low-cost equipment for farm lines.

Harry Slattery appointed administrator of the REA.

McGregor Smith succeeds Bryan Hanks as president of Florida Power & Light Co.

Narragansett Electric Co. starts work on installation of 40,000-kw. generating unit in Manchester Street station at Providence.

U. S. Circuit Court upholds San Francisco's right to dispose of Hetch Hetchy power through Pacific Gas & Electric Co.

Technical experts meet at Edison Electric Institute headquarters in New York to study interconnection plan.

Philadelphia Electric Co. announces plans for 50,000-kw. unit at Chester plant.

Wisconsin Electric Power Co. announces plans to install 35,000-kw. turbo-generator and high-pressure boiler in Commerce Street plant.

OCTOBER

Public Service Electric & Gas Co., Newark, N. J., and Georgia Power Co. order turbo-generators.

Nebraska Power Co. signs contract with three federally financed hydro projects.

Lower Colorado River Authority makes agreement with Central Power & Light Co. for purchase of facilities in thirteen towns.

Gano Dunn awarded Hoover Medal for 1939.

Government power committees consolidated; National Defense Power Committee, headed by Assistant Secretary of War Johnson, transferred to National Power Policy Committee, headed by Ickes.

Cleveland Electric Illuminating Co. begins construction of new power plant.

Duke Power Co. starts work on construction of 80,000-kw. addition to Buck steam plant on Yadkin River.

Nebraska public power district takes over Columbus properties of Northwestern Public Service Co.

Central New York Power Corp. lays cornerstone of new 80,000-kw. plant in Oswego.

N.E.M.A. meets in Chicago. Swartzbaugh elected president.

NOVEMBER

Shea new president of North American Co.; Fogarty chairman of executive committee.

Philadelphia Electric Co. announces plans for 500,000-kw. steam plant on Delaware River.

Associated Gas & Electric Corp. files new integration plan with SEC.

Consolidated Gas, Electric Light & Power Co. of Baltimore awards contracts for 67,000-hp. turbo-generator at Westport station.

Kellogg urges industry and state commissions co-operate to establish flexible rates to meet increase in operating costs.

Consumers Power Co. dedicates new 70,000-kw. Bryce E. Morrow station.

Proposals for city power systems rejected at elections.

Iowa-Nebraska Light & Power Co. completes negotiations for purchase of energy from Nebraska power district.

Young and Swope retirement from General Electric announced. Reed and Wilson named.

Utility-government armistice interrupted by attacks on industry by Norris, Rankin, Lilienthal and Carmody.

Ickes calls conference of utility executives in Washington.

State commissions order users of fluorescent lamps to install power-factor corrective equipment.

Circuit Court of Appeals upholds Appalachian Electric Power Co. in New River case.

Associated unit seeks RFC loan.

DECEMBER

Power Policy Committee starts utility meetings in Washington. President Roosevelt discusses national grid.

Portland General Electric Co. signs Bonneville power contract.

McLaughlin, Puget Sound Power & Light president, sees giant power pool as northwest solution.

Leo Crowley accepts chairmanship of Standard Gas & Electric Co. board.

TVA closes contract for purchase of northeast Mississippi properties of the Mississippi Power Co.

Charles Freeman elected chairman of Commonwealth Edison Co., succeeding the late James Simpson.

SEC prepares to proceed on utility integration.

Oklahoma files suit in state high court against Denison Dam project.

Pacific Gas & Electric offers to use Shasta Dam energy.

Whiteford elected president of Associated Gas & Electric Co.

Power Policy Committee widens grid discussions, President Roosevelt appoints Emil Schram, chairman of the RFC, to the committee.

Union Electric Co. of Missouri announces largest construction program in recent years —an outlay of $20,000,000.

Mississippi Power Co. sells northern properties to TVA and cities.

Standard Gas & Electric Co. sets budget at $37,047,735.

Henry L. Doherty dies.

Ohio Public Service Co. places $3,000,000 orders for new generating and distribution equipment.

SEC authorizes $18,594,000 Consumers Power bonds; sale of 125,000 shares common at $28.25 a share to Commonwealth & Southern; refused $10,000,000 bonds for new capital.

Looking Backward

A digest of the 1939 activities of or affecting the electrical industry

S. B. WILLIAMS
Editor "Electrical World"

LAST YEAR was an almost perfect example of the buoyancy of the electric utility industry. It took in 1938 the sharpest dip on record and in 1939 the sharpest rise. It came back just as fast as it went down.

With few exceptions the output each week established a new record for that particular week. It followed the 1937 pattern fairly generally until mid-July, when it began to climb faster than any previous record, with several weeks going over 2½ billion kw.-hr. as an indication that 1940 peak week might exceed 3 billion.

This sudden spurt sent utilities into the market quickly for more generating equipment, with the result that 1940 will be a fine year for turbine manufacturers and 1941 may establish a new record for steam equipment production.

One of the difficult things to understand is the continued addition of hundreds of thousands of new customers—almost a million added last year. Apparently the frontiers here will all be exploited. More than 60 per cent of these were residential customers.

In only one year, 1934, was less new capital raised than last year. Refinancing, on the other hand, was large, being exceeded only in 1935 and 1936.

This year, however, should see considerably more new capital come into the industry, if the construction budget of 605 millions announced at the beginning of the year is carried out.

There has always been some confusion as to the investment in the utility industry. Estimates made upon estimates year after year are apt to be very misleading. Census data for 1932 and 1937 are available, and with these as a base, using the known new capital additions, we reach a total of $12,790,000,000. In round figures the fixed investment may be put at 13 billions.

Manufacturing

The increase in taxes during the year was not large. In fact, the percentage to gross is less than it was a year ago.

Rates, on the other hand, instead of reaching a level, as some people thought, took another nose dive last year. In fact, 1939 was only 24 per cent behind the peak year of 1937 in volume of rate reductions. It seems likely that the customers received more than 40 millions in rate cuts last year.

War broke out in Europe the first of September. By that time improved electrical business was already under way. What the war did was to stimulate forward buying and thereby speed up industrial production. This resulted in more power sales and greatly accelerated equipment sales. Production was up to over 2 billions, but was still below 1937. With continued good business 1940 might establish a new record.

Prices stiffened slightly, but in several lines were still below what they should be. The indications are that while the trend is upward there will be no runaway price market.

Manufacturers polled on the question of foreign war orders were almost unanimous in voicing their disinterest.

Orders for transmission and distribution equipment reflect the growing utility load. Steam-generating equipment production, while a long way from factory capacity, is getting close to the capacity of available skilled labor. This supply is being increased. Industrial equipment is also moving ahead rapidly as the direct result of the pick-up in general business.

Commercial

Appliances, on the other hand, while showing an improvement over 1938, show also the need for greater local promotion. Dealers are taking the lead in sales in heavy appliances, but perhaps such merchandise would move faster if less were left to dealer initiative.

Housing projects were responsible for most, if not at all, of the improvement in major appliance sales. The matter of saturation is going to be a factor in holding back refrigerator sales unless replacements, now running at about 25 per cent of total volume, are speeded up.

The year saw further elimination of wiring subsidies, which had some effect on range and water heater sales. There is also a tendency to resist further reduction of end step in rates. Some managements have been questioning the advisability of going as far as they have.

Adequate wiring in its second campaign year showed marked progress. Promotional activities are now under way in approximately 2,000 communities covering 75 per cent of the wired homes, while certification is in effect in 25 per cent.

Thin wall insulation was accepted as an approved

wiring material. Its use is expected to speed up the adequate wiring of commercial buildings.

New developments in volume merchandising at reduced prices brought big sales in New York for refrigerators and radios. A four-month campaign was budgeted to replace a million ice boxes. The New York package campaign idea spread to a number of places early in the year, but by the end of the year interest seemed to have waned.

Engineering Trends

Considerable spurt was given to higher-pressure, higher-temperature turbine and boiler installations during the year.

Circuit breakers swung noticeably toward oilless designs. Industrial plants reflected a strong trend toward metal-clad switchgear.

Late in the year a movement to standardize upon a universal interchangeable arrangement of distribution transformers as to tank, mounting, terminals and bushings was nearing fruition.

Demand metering received added impetus by regulatory attitudes dictating the use of demand meters in increasing proportion of the instances carrying demand element in the rate. Meters protected against lightning damage or destruction have been asked for.

Use of capacitors was quickened both by the power industry and industrial plants to secure the ultimate capacity out of distribution facilities.

Reliance upon wood for impulse insulation gathered momentum as an adjunct to superior proofing of transmission lines against lightning, and with this went installation of expulsion tubes and gaps as well as extensive counterpoise installations. More intensive studies of grounding were also common.

High-voltage d.c. transmission received a boost from the late J. D. Ross of Bonneville as a means for bringing Columbia River power to the East. Bonneville administration began making investigation of the feasibility. It was demonstrated, however, at A.I.E.E. meeting that d.c. is not a competitor of a.c. for long distances.

Two new radio channels were opened by F.C.C. to utilities—2,292 and 4,637.5 kc.

Lighting

Fluorescent lighting was pushed ahead by the New York and San Francisco fairs. More than a million tubes had been produced by the end of the year, with 36-in. and 48-in. predominating. Two state commissions, Kentucky and Oklahoma, ruled against low power factor.

The momentum of incandescent sales, however, continues. Nearly a billion were produced last year.

Safety highway lighting was accelerated by the education campaign of the U. S. Junior Chamber of Commerce in 43 cities to detect night accident zones.

Infra red lamps for industrial drying and germicide lamps were in greater demand.

Labor

The year saw more labor disturbances than any other—strikes in Missouri, Michigan and N. Carolina.

Effects of the Consolidated Edison labor decision of previous year was to strengthen position of N.L.R.B. During the year Pacific Gas & Electric was ordered to set aside the election of 1937 resulting in a company union.

One interesting sidelight of the year was deletion from state Federation of Labor constitution in South Dakota of statements favoring public ownership on the grounds that private utilities were easier to organize.

Regulation

The question of state regulation of municipal operation came up again, with the National Association of Railroad and Utilities Commissioners urging the same regulation for municipal as for privately owned utilities. At about the same time this action was being taken the municipal plants of the state of Washington were opposing regulation.

Federal Power Commission extended its authority further within states by holding jurisdiction over a utility (N. J.P. & L.) wholly within a state, but the lines of which comprise part of pathway by which energy is transmitted in both directions across state lines. The commission also issued a report on breakdowns, stating that although they were purely local they had an effect on interstate business.

Several commissions were reorganized during the year. The most interesting was Rhode Island, which transferred utility regulation to a new department of business regulation. Michigan ousted its commission and formed a new one.

Legal

Some far-reaching legal decisions came down during the year, the most important being that of the fourteen utilities vs. TVA, in which it was held by the United States Supreme Court that utilities had no monopoly and that competition, whether by government or private utility, was legal, that TVA operations were not illegal government regulation and that sale of government property in competition with others is not unconstitutional.

The same court in the Edison Light & Power case by upholding Smyth vs. Ames declined to accept the prudent investment theory.

FPC was refused jurisdiction by the Appellate Court over hydro development that does not involve navigation.

Taxes

The loss of taxes to state and local governments when public power succeeds private ownership stirred up action in several places. Alabama and Georgia produced bills restoring to their government units all tax revenues lost when private power was taken over.

Tennessee taxpayers started a campaign to secure from TVA enough to cover tax losses resulting from sale of private utilities. The matter will be brought up this year in Congress.

Oregon PUD's will pay the same taxes as private companies. REA lines were also feeling the pinch of

taxes. Two lines, one in Ohio and another in the Northwest, asked for tax reductions.

Michigan had some difficulty collecting its 3 per cent tax on municipal plant bills. The state was upheld.

REA

At the close of the year REA had built some 180,000 miles of lines and was serving approximately 400,000 consumers. During the year intensive load building was started with an experiment in Iowa where prices were slashed 25 to 35 per cent. The results were such that the plan is to be put into more extensive use this year.

The drive is constantly toward lower line and service cost. Meter purchases were syndicated and other products studied for similar purchasing action. An experiment in service for low income farms able to pay only a dollar a month for service was announced with low-cost equipment and a 600-watt transformer.

The year saw more co-operation between the private companies and REA. Georgia Power, for instance, started a program of sending demonstrators into REA territory to speed up usage.

Municipal Ownership

Elections on municipal ownership were especially quiet last year. What few cases were up went almost all against public ownership. This situation reflects the stoppage of government subsidies for this purpose.

For the eighth time San Francisco turned down municipal ownership. The city voted to ask Congress to amend the Raker Act so as to permit the use of Pacific Gas & Electric distribution facilities for Hetch Hetchy power.

SEC

Little came of the filing of integration intention in December, 1938. Reorganizations and widespread change in personnel resulted in little activity until late in the year, when it was stated that the commission was ready to go ahead with enforcement of the law. The most startling action of the commission was to deny Consumers Power permission to sell new mortgage securities, but insisted that the money come from the sale of common stock.

There was some simplification of corporate structure to conform with the act. International Paper & Power disposed of its holdings and North American dissolved its subsidiary, North American Edison Company.

Government Policy

The National Defense Power Committee was dissolved and the work taken over by the National Power Policy Committee. Its principal effort has been to secure acceptance of the grid plan for which the government would appropriate several hundred million dollars. In this plan is included government-owned, mouth-of-mine super-power plants. Utilities would be required to scrap old plants to be participants in grid operations. Meetings were held with utility executives from all of the important industrial areas.

There was little attack by the Administration during the year, although several anti-utility speeches late in the year looked as though a new onslaught had started. All involved denied that there was any collusion.

The President declared that the government would not extend its power development program, although negotiations have been under way with Canada over the St. Lawrence Seaway.

It was proposed to consolidate all government power bodies in one unit. Most of them now are under the Department of the Interior.

The President asked Congress to breathe new life into Passamaquoddy and the Maine Legislature set up a state district. Nothing was done.

Public Power

The most important event of the year in this field was the settlement of the TVA controversy whereby Tennessee Electric Power and Memphis Power & Light sold out to TVA and the cities in the system. The price paid was much better than the first offer. Congress would not appropriate more money than was required for the operation.

In addition to this purchase TVA and local communities purchased facilities of West Tennessee Power & Light, northern properties of Mississippi Power. Lower Colorado River Authority purchased facilities of Central Power & Light in thirteen towns and of Texas Power & Light in sixteen counties. Nebraska "Little TVA" was unsuccessful in its purchase of Iowa-Nebraska Light & Power, but did take over the Columbus Division of Northwestern Public Service. Bonneville took over Willapa Electric.

While the government appears to be starting no new hydro projects, the "Little TVA's" plan that lost out in Congress is now bobbing up as state authorities. Arkansas is asking for an authority to develop White River Valley in Arkansas and Missouri. A Niagara River Power Authority is proposed to co-ordinate and develop Niagara and St. Lawrence Rivers. Illinois applied for permission to develop Illinois River, but in this case to distribute the energy produced through private companies.

It became increasingly apparent as the year went by that a greater degree of co-operation was developing between government power authorities and private utilities. TVA contracted to sell power to Commonwealth & Southern properties in Georgia and Alabama, Texas Power & Light and Houston Light & Power contracted to buy Lower Colorado River power. Portland General Electric contracted with Bonneville. Nebraska sells to Nebraska Power and Iowa-Nebraska Light & Power.

Outside of the purchase of the Tennessee properties TVA's achievement of the year was receiving a clean bill of health from the Congressional investigating committee.

All in all the year was one of distinct progress. Business was better, service expanded, money easy, legislation small, public relations better, government co-operation improved. It provided a fine springboard for 1940.

Manufacturers See Good Year in 1940

Expect 5 to 20 per cent increase — Durable goods look better — Appliance manufacturers optimistic — Few actual price increases, but higher labor and material costs expected

C. E. SWARTZBAUGH
President National Electrical Manufacturers Association

IT HAS been customary late in each year for the president of the National Electrical Manufacturers Association to prepare a statement regarding the hopes and expectations of the manufacturing branch of the electrical industry for the coming year.

Considering the imponderables affecting business and business confidence, prophesying is a task which one may well approach with temerity, even though the predictions made are a composite of the views of many prominent electrical manufacturing executives rather than strictly his own.

When one reflects on the accuracy of many prophecies in recent years, few business men will need to be warned not to consider predictions such as these as either inflexible or infallible.

However, 1940 is the first time since the depression that business generally enters a new year with reasonable assurance that it can look ahead just a little way with confidence. And what is true of business generally in this respect is perhaps true to an even greater degree of the electrical manufacturing industry.

But before pushing out into the uncharted seas of the future, it is perhaps desirable to evaluate the industry's progress recently—to do so may prepare the background for later predictions.

Added Factors

The electrical manufacturing industry kept pace in 1939 with general business improvement, following much the same pattern. It took in stride the considerably increased production demands made upon it during the third and fourth quarters and is today geared to take full advantage of any continued improvement in general business conditions. That's a distinct advantage.

Several added factors will perhaps enable the industry to secure more than average benefits from any general upturn because:

1. The electrical manufacturing industry sells to, and its sales are benefited by improved conditions in, almost every other industry you can think of.

2. New products—better engineering, and product design, all of which have featured its efforts in recent years continues—these result in greater efficiency and lower service costs to the consumer. The consuming public will receive more value for its money in 1940 than ever before from the electrical manufacturing industry.

3. Joint co-operative industry programs such as the Modern Kitchen Bureau, Adequate Wiring, etc., are now matured and seasoned to a point where they will produce *maximum* results from any general increase in business activity.

4. One of the dividends resulting from such market development programs is better relationships between the various branches of the industry. Contacts resulting from the joint conduct of these programs inevitably make for greater understanding of the other fellow's point of view—and a more generous appreciation of his problem.

Co-operation

If during 1940 the electrical industry could initiate a joint program on commercial and industrial electrical modernization, to add to its already existing programs —well, that *would* be something.

In football "down-field" blocking is more important in manufacturing a score than "ball carrying." If the branches of the electrical industry can all pull together to take maximum advantage of any upturn, 1940 might conceivably be the best year the industry has experienced since the roaring "twenties."

The manufacturing branch of the industry is ready and willing to do its part. It will spare no effort to get its share of the annual income.

And now for a composite condensed résumé of how electrical manufacturers in N.E.M.A., with whom I have consulted, view business prospects in general and prospects in the electrical manufacturing industry in particular for 1940.

1. Basic Trend of Business in General

Purchasing power curve still rising—has been for some time—same with production and employment. Business sentiment improved—improved sentiment and confidence *usually* precede improved business. First quarter level off some from late 1939—not too much. Over-all results for year probably considerably better—estimates range from 5 to 20 per cent—average perhaps 10 per cent—much confidence. *Some* real enthusiasm.

2. Outlook for Durable Goods

Much improved—the pendulum swings—better business sentiment should increase willingness to make capital investments—handcuffs on financing still a problem, but modernization and expansion, especially the former, has to come.

3. Electrical Manufacturing Industry

(A) *Heavy Apparatus—Durable Goods*—Power consumption creating new all-time peaks—further business increase will require additional investment by utilities—if left alone for a while they'll find ways to finance all necessary equipment to increase present power output.

Requirements of government, utilities and industry presage good year for electrical durable goods.

(B) *Consumer Durable Goods and Consumer Goods*—Recent heavy production apparently not excessive—volume of retail sales indicates that no burdensome inventories have been created in hands of manufacturer, wholesaler or retailer.

C. E. Swartzbaugh

Refrigerators at many points reaching replacement stage—electric range making steady and gratifying progress—bigger values in both for the consumer—better profits for manufacturer through volume—improved processes.

More Buyer Appeal

Consumer goods (table appliances) acceptance increasing—more efficient, better engineering, better styled than ever. Rural electrification will probably increase market by 250,000 homes this year—wider distribution.

Sales training a problem for all manufacturers of appliances—some refrigerator, range and broad line appliance manufacturers may attack it (considering the rapid turnover in dealers' sales organizations, a joint industry national attack on this problem might produce more effective results).

No one seems to be taking anything for granted—new products—new sales promotions—new advertising approaches are all in the making.

Happy Hopes

But appliance manufacturers are optimistic—some enthusiastic—most are budgeting for 10 per cent increase; some more, a few less.

(C) *Miscellaneous*—New housing projects an important factor—will produce much business—utilities also have big backlog of need for expansion and modernization—same with industrial plants—more modernization than expansion, however.

If war continues, some increase in exports—apparently no electrical manufacturer wants much war business—profits from war business seem to be an exploded myth. But U. S. national defense program expected to result in heavy purchases of electrical products and equipment.

Prices

Some firming of prices of electrical products in 1940, but few actual increases, at least in first six months, despite other probable rising costs—long-term price trend up, however.

Labor — Labor Costs

Skilled labor may become a problem in some branches of industry—recent labor developments improve situation some—sit down, slow down apparently out—yet labor unrest and good business are concomitant—labor cost trend up despite relative stability cost of living.

Profits

Expected increased volume should produce lower unit costs, this despite anticipated increase in labor and material costs. Most electrical manufacturers expect 1940 to be a good year profit-wise, but realize that much of what used to be classed as profits must today be shared more and more with government and labor.

So, for what it's worth, this is about the way we electrical manufacturers guess 1940 will turn out. A successful business man is one who can guess right about 51 per cent of the time—at least that's one definition.

Editorials

S. B. WILLIAMS, *Editor*

SEC Ruling on Equity Versus Mortgage Financing

THE SEC rulings with respect to Consumers Power financing have caused considerable confusion in financial and holding company circles. The intimation that as a result there might be a congressional investigation of the commission is probably wishful thinking, for in all likelihood the commission was well within its rights in handing down these rulings.

In substance the commission ruled that the new money should come from equity participation rather than an increase of $10,000,000 in the bonded debt. Immediately this ruling raised the question as to who would furnish this equity money, the public or the Commonwealth & Southern, which now owns 100 per cent of the common stock of the operating company.

The amount involved obviously is a rather large sum for a holding company to invest at this time in one subsidiary, especially as it already is taking three and a half millions in new common. So long as the shadow of the utility act falls on the holding companies they are not going to find it easy to issue offsetting stock of their own. The alternative is public participation in operating company equity; a minority interest, in other words.

For years the utility industry has been of the opinion that it could not sell common stock to the public. As was stated above, this is probably true of the holding companies. But what of the operating companies? When the government was subsidizing municipal ownership, floating common stock in an electric utility had its drawbacks. But considering the fine records of most of the operating properties, maybe the public market is more receptive today to new utility stock.

Certainly if Consumers Power common stock found a ready public market at a fair price it would lend encouragement to these electric utility executives who have repeatedly asked for conditions that would permit a return to equity financing. On the other hand, if such a market was not readily available the SEC would be placed in the position of having to permit some other form of financing or else shoulder the blame of restricting the growth and expenditures of the utilities.

While admitting the right of the commission to make these rulings, it would be interesting to know whether this was an isolated decision or whether it is to be the policy governing all future new capital financing. Also, has the commission given full consideration to the possible effect of minority equity ownership on future integration? And, finally, is there not something to be said in favor of 30-year bond financing at a yield of less than 3 per cent? With this long-term financing at such a low rate, will it not be much simpler to secure public equity participation, such as the commission suggests, for future new capital? In other words, why not use cheap money so long as it is available; that is, if the commission's thinking is co-ordinated with that of other governmental bureaus in seeking low electric rates for the consumer?

The Rank and File Are Human

THE OTHER DAY an employee of an Eastern utility took time out of his vacation to come in and ask us to ask "the bosses" to be a little bit more human with the men working under them. The chap said that if the bosses would just stop for a minute to chat with a gang of men, or eat lunch with the fellows in their department, or be less gruff and abrupt, the rank and file wouldn't have much to complain about.

Strangely enough, it wasn't the big shots that this fellow was thinking about. It was the department heads, foremen, supervisors. These were the people who by careless handling of the feelings of the fellows under them were making the men discontented.

Before coming to us this fellow used his vacation to travel a bit and check his ideas with other fellows similarly employed elsewhere. They seemed, he said, to have no complaint with the money they received or the kind of work. In fact, they liked to be in the utility business.

Of course, we understand the danger of generalizing from one man's views, nor would we were it not that others have voiced similar thoughts. Sometimes they were fellows in very small jobs and sometimes in fairly big jobs. The point of the complaint has ever been the smallness of the man above them and their inability to get beyond him.

Nor is this situation peculiar to utility companies. In every occupation we hear the same complaint. The only difference is that in other industries a man can leave and go with a competitor. In the utility business there isn't the same opportunity to shift.

The executives of the utility industry have been of the opinion that their people were dyed-in-the-wool utility people, and while they might have grievances they were nothing serious. They are probably right that utility

people like to work in the utility business, but these employees are becoming more and more realists every day. They know the weaknesses of their own set-up and a great many of them are no longer viewing New Deal policies with the same degree of distaste as their executives.

Public relations are always to be cultivated, but before any lasting results can come from such activity there must be good employee relations. Most good or bad employee relations are created by simple human activities. "Bosses" won't make much progress simply by reading in a book how it should be done. They might learn by the example of their superiors.

Labor Knows When It Is Better Off

THIS SUMMER the South Dakota State Federation of Labor in its annual convention deleted from its constitution a clause favoring public ownership of electric utilities. The reasons given in the resolution were as follows:

That they have seldom been successful in organizing employees of municipal plants;

That where they were successful in such organization it was impossible to secure signed agreements because of the whims of changing administration;

That they had organized nearly all the large private utilities of the state; and

That they had secured signed agreements covering better wages, shorter hours and improved working conditions for private utilities.

The Constitution still favors public ownership of natural resources, but even this may go if public ownership of streams is predicated upon public distribution of electricity. State after state and county after county have found that with public ownership they must look elsewhere for tax revenue. Labor apparently is finding that private initiative offers better employment conditions than public.

Organized labor in the past has been pretty much anti-private utility, but as organization proceeds we expect to find labor and utilities seeing more eye to eye.

Lowest Common Earnings Denominator Rejected

IN APPROVING for the time being a new rate schedule of the Quincy Electric Light & Power Company the Massachusetts commission used a phrase of striking significance in relation to regulatory policy. The board declared its unwillingness to penalize for its enterprise a property selling electricity at prices among the lowest in the state by forcing earnings to the *level of the lowest common denominator*. The commission did not see eye to eye with the company as to the possibilities of further rate reductions, but it recognized the need of earnings large enough to attract capital besides meeting all fixed and running costs, and referred to declarations of the Supreme Court in this connection. And so it allowed the new rates to go into effect, reserving the right to study their results and initiate further proceedings if necessary later.

The mere approval of a rate schedule by a state commission would call for little comment, if any, on our part, but so forthright a refusal to press the earnings down to what the board so aptly classed as the "lowest common denominator" level deserves attention, coming, as it does, on top of the Illinois decision that a 5 per cent return was not confiscatory. If the utility business, or any other, for that matter, is to prosper and best serve its customers there must be a margin above costs which is measured with liberality in a fair sense of the word. Regulation, rightly done, is done in a broad-gauged fashion; not on a cheese-paring basis.

Growth from New Customers Still Important

FOR SEVERAL YEARS people have been saying that the age of expansion by opening new customer territory was over and that growth must come from our present customers. However much truth there may be in the latter part of that statement, the facts show definitely that the days of growth by the route of new customers for electric service are far from being over. To our amazement in making comparisons with 1929 we found that in the last ten years the number of additional customers taking utility service has been 4,600,000.

One's first thought might be that these are mostly farms, but new rural customers, including REA, account for only one-quarter of the total. This customer growth is probably faster than population growth. Certainly it was last year when the number of new customers was 900,000.

The figures are not as large as the number of customers added during the '20s. But then the industry was busily engaged in wiring old houses. However, in terms of business from new customers it is probably true that the 550,000 new residential customers added last year produced as much added business in energy sales as those added in any one of the boom years. A new customer today, especially if he goes into a new home, has so many more ways of employing electricity that his initial usage is considerably higher.

At the close of this year there will be close to 30 million customers of electric utilities. Of these, more than 23 million will be residences and more than 2 million farms. Therein lies the stability of the utility business, particularly as these residential and farm customers by the end of this year will be averaging not far from one thousand kilowatt-hours each annually.

NEWS OF THE WEEK

Associated Gas Files Bankruptcy Petition

Top holding company in billion-dollar system takes action following denial by SEC of petition for dividend and interest payment by underlying Associated Gas & Electric Corp.

Associated Gas & Electric Co., top holding company in the billion-dollar utility system, headed for a complete reorganization this week as bankruptcy papers were filed in Utica, N. Y., under Chapter 10 of Bankruptcy Act, following refusal of the SEC to approve dividends on capital stock or interim interest on 5 per cent income note of Associated Gas & Electric Corp., the underlying holding company, payable to Associated Gas & Electric Co.

Because the top company does not have sufficient funds in its treasury, without the interest and dividends from the corporation, to pay interest due January 15 on its $11,868,500 of 4½ per cent convertible gold debentures due 1949, bankruptcy action followed as of necessity.

Impair Cash Position

The SEC found that payment by the corporation "will impair the financial integrity of that corporation by imperiling its ability to pay interest on the debts having prior claims to earnings." It was held that "many of the subsidiaries of the system are in none too good a cash position" and that the corporation has not supplied funds to its subsidiaries since around 1932.

Counsel for the corporation argued that it was necessary for the SEC to forbid payment of either dividends or interim interest in view of the fact that all basis for such action could be removed by adoption of a plan of reorganization for the system, under section 11-E of the holding company act.

The SEC countered by stating that execution of a reorganization plan involving a system as complicated as the Associated System "is impossible in a period of less than several years."

Will Appoint Trustee

The commission stated that it had decided to issue the order at this time despite the fact that the corporation would have "scant opportunity to seek judicial review" before January 15. However, the company assured the commission that it had no intention of seeking a judicial review.

With the Associated System in receivership, the court will appoint a trustee to work out a reorganization or liquidation of the top company. Associated Gas & Electric now has with the SEC a plan of integration under the utility act and it is likely that this plan, together with the plans which have been formulated by the commission, will come under consideration when the court considers final disposition of the company.

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Long Island Lighting to Purchase Utility

A petition was filed last week with the New York Public Service Commission by the Patchogue Electric Light Co. for permission to sell its property and franchises to the Long Island Lighting Co.

Long Island Lighting has agreed to purchase the Patchogue company, only privately owned public utility in Nassau or Suffolk counties not already a part of the Long Island Lighting system, for $1,500,000, according to Edward F. Barrett, president.

Sale of Patchogue Electric Light, subsidiary of Associated Gas & Electric, marks another step to comply with the integration provisions of the utility act. Purchase of the property will establish a unified gas and electric system for Long Island Lighting from the New York City limits to Montauk Point, with the exception of three municipal systems operated by Rockville Center, Freeport and Greenport.

Mr. Barrett said that if the deal is approved the purchase would probably be financed through bank loans.

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Asks Rate Investigation

Pennsylvania Public Ownership League has petitioned the Public Utility Commission to investigate what it contended were "unjust, unreasonable and discriminatory rates" charged by the Metropolitan Edison Co. of Reading. The league maintained in its petition that the utility's property valuation was "grossly inflated" and that rates brought in excesss of "reasonable returns."

•

Plan New Rural Lines

Construction by four utilities companies of a total of 103 miles of rural electric lines has been authorized in orders issued recently by the Illinois Commerce Commission. The companies which will build the lines and the total construction for each follow: Illinois Northern Utilities, 36 miles; Mt. Carmel Public Utility & Service Co., 1.8 miles; Illinois Iowa Power Co., 9 miles, and Public Service Co. of Northern Illinois, 56 miles.

House Group Considers New TVA Tax Measure

Norris-Sparkman adjustment bill designed to return to states revenue displaced by government agency — Chairman May to hold hearings starting on January 23

The Norris-Sparkman tax adjustment bill, designed to return to states in the Tennessee Valley revenues displaced as a result of the TVA's purchase of private utilities, will be taken up by the House military affairs committee on January 23.

In making the announcement Chairman Andrew Jackson May (D., Ky.) asserted his committee would give the TVA tax situation "fair and impartial consideration." He indicated that hearings would be held and county and state officials, as well as other interested parties, would be given an opportunity to testify.

Consider Excise Tax

He revealed that he had been considering a federal excise tax to be levied on consumers of TVA power "to recoup the tax losses." However, he admitted that he had some misgivings that such a tax constitutionally could be made to apply only to TVA power consumers and not to all other electricity consumers throughout the nation.

"The problem is very complicated," he stated, adding that grave constitutional questions were involved. The Norris-Sparkman bill would authorize the TVA to make payments to the states "in lieu" of taxes formerly paid by private utilities, but would not permit the states or local subdivisions to tax the TVA outright.

Under the bill the TVA would be permitted to pay over to the states of Tennessee, Alabama, Kentucky, Georgia and Mississippi sums starting at 10 per cent of the TVA's annual gross receipts and graduated down to 5 per cent over an eight-year period. According to TVA estimates, this would not permit a full adjustment of taxes, but would make allowance for benefits received by states and local subdivisions from the TVA's program.

The TVA tax situation received considerable attention last year when Congress authorized the TVA to purchase properties of the Tennessee Electric Power Co. At that time the TVA asked that tax legislation not be included in the acquisition bill because its tax studies had not been completed. Nevertheless, the House passed an amendment to the acquisition bill prohibiting the TVA from making any tax payments whatever, but the amendment was finally killed in conference.

Tennessee congressmen and other representatives of TVA states have been insisting on 100 per cent adjustment of taxes and have expressed opposition to the Norris-Sparkman bill in that it provides only partial adjustment.

Due to the anti-TVA majority on the military affairs committee and in the House, chances for tax replacement of any kind are considered slight this session of Congress.

At least fourteen of the 25 members of the House committee are considered hostile to TVA and the chances of a bill emerging which is in any degree favorable to TVA are considered slight. In fact, observers expect a majority of the committee again to attempt passage of legislation to curb the agency.

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Dissolves Alabama Group

A row among a group of South Alabama municipalities over an attempted public ownership electric program has resulted in an order by the Alabama Public Service Commission dissolving the South Alabama Power Authority, the agency recently created to administer the project. The authority contemplated purchase of the electric facilities of the Alabama Water Service Co. in five counties through the issuance of $2,000,000 of revenue bonds.

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California Oregon Power to Spend $1,014,000

Hance H. Cleland, president of California Oregon Power Co., announced a construction program for 1940 of approximately $1,014,000. Every section of the territory served will be affected by the program.

A new transmission line between Medford and Grant's Pass will be built at a cost of $150,000. Other lines will be rebuilt and new substations and switching stations will be added.

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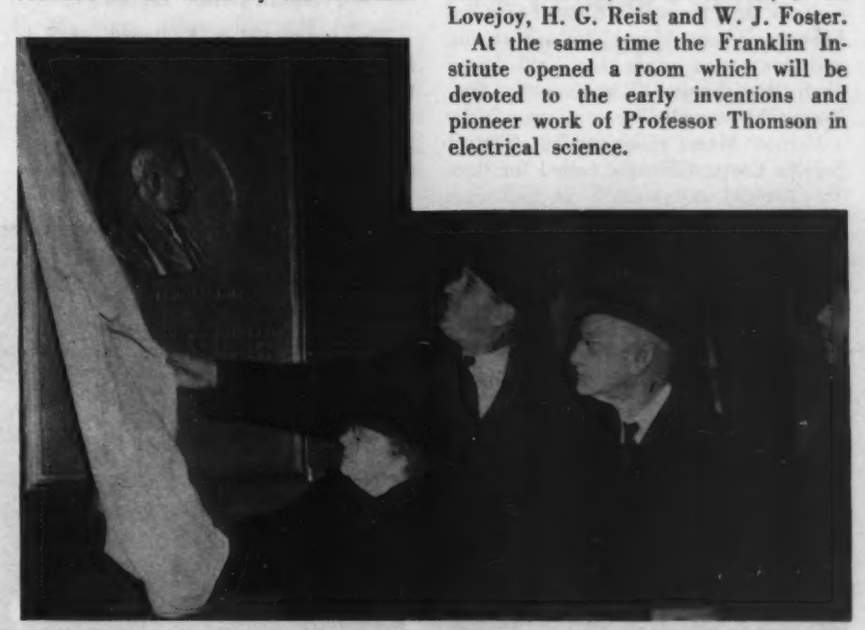
Unveil Bronze Tablet to Prof. Elihu Thomson

Last week in Philadelphia a beautiful bronze tablet was unveiled to mark the spot where the late Prof. Elihu Thomson, co-founder of General Electric Co. and one of its greatest scientists, built his first bi-polar dynamo for generating alternating current. It was sponsored by the Franklin Institute through the generosity of four of Professor Thomson's associates, A. L. Rohrer, J. R. Lovejoy, H. G. Reist and W. J. Foster.

At the same time the Franklin Institute opened a room which will be devoted to the early inventions and pioneer work of Professor Thomson in electrical science.



HONOR SCIENTIST—Marking the spot where the late Elihu Thomson, scientist and co-founder of General Electric Co., built his first bi-polar dynamo for generating alternating current, early associates, in co-operation with the Franklin Institute, unveiled this tablet last week in Philadelphia. Left to right is Mrs. Thomson, Dr. Henry B. Allen, secretary of the Franklin Institute, and Albert L. Rohrer, one of the oldest living Thomson associates

Greater Expansion Seen for Electric Industry

President Wilson of General Electric tells utility operating and sales executives that steady growth will mark new era — Company resumes sales conference at Institute

An era of sound expansion for the electric industry, even greater than that of the 1920's, was forecast by Charles E. Wilson, president of General Electric Co., last week in his first formal appearance as president of the company.

Speaking to more than 300 operating and sales executives of utility companies assembled at the resumption in Bridgeport of G. E. "Central Station Sales Conferences," Mr. Wilson said he saw many signs of steady growth and greater expansion of the electric industry. Terming this industry one of the spark plugs of business, Mr. Wilson predicted that the electric industry will be one of the major beneficiaries of the growth to come.

Load Building

Encouraged by the resumption of G. E. "Central Station Sales Conferences," utility men spent two days at the newly opened General Electric Institute in a series of meetings, the keynote of which was the vital necessity for continued utility participation in appliance sales and promotion. Prominent utility figures presented analyses of current load-building policy and procedures, and representatives of General Electric presented appliance advertising and promotion plans for 1940 based upon the theme, "It's Easy to Stay Young Electrically."

Vernon Moon, vice-president Central Service Corp., Chicago, called for "net building" instead of load building. The industry's investment ratio of 6 to 1 is rising, Mr. Moon said, and as a result increasing fixed charges will require a greater search for net earnings, especially in the residential field.

The utility cannot forsake appliance sales and promotion, said J. M. Stedman, manager residential sales, Pennsylvania Power & Light Co., Allentown, Pa., but rather must be a "flying wedge" paving the way for sustained and comprehensive local sales effort. For a utility to walk out of appliance merchandising is suicidal, Mr. Stedman stated and no dealer co-operative program can succeed, he said, unless it is co-operative on both sides, sincere, creative and consistent.

Walter Sammis, vice-president Commonwealth & Southern Corp. and chairman of the Modern Kitchen Bureau, described costs and methods of financing the bureau, and C. J. Coward of the Ralph H. Jones agency described the 1940 advertising plans and announced that Donald Duck, a Disney character, would help sell electric water heating in 1940.

Promote Better Lighting

This year, said R. F. Barnes of Nela Park, we should rededicate ourselves to the principle that it takes three times as much light to read a newspaper as a good book, and after displaying charts depicting the rapid growth of large wattage lamps, he stated that in 1939 a total of 31.7 billion kilowatt-hours were used for lighting.

A. L. Scaife, assistant manager of advertising and promotion, displayed the national advertising to be used by G.E. during the coming year and a series of advertisements to be used by utilities faced with rate reductions. Boyd Bullock advertising manager, stated that with 66 2/3 per cent less appliance salesmen in the industry than in 1938, G.E. would have to do more to sell and utilities would have to do more selling, more promotion, more advertising.

Predicting that 1,000 new homes will be built during every working day of 1940, C. W. Stuart, manager G.E. Home Bureau, demonstrated that a modern, all-electric home, using 4,956 kw.-hr. per year can be bought by monthly payments only $3.83 in excess of those required for a sub-standard middle class home.

Other speakers included R. L. Burgan of New York State Electric & Gas Co., who predicted that new uses for electrical service will help make more rural lines self-supporting.

•

File Provisional Schedule

Interstate Power Co., complying with a Federal Power Commission order, has filed a provisional new schedule reducing the rates for electric service available to the Albany Lighting Co. of Albany, Illinois.

The new schedule is provisional and before the final filing with the commission is to be submitted to the Albany Lighting Co. for review and comment. It amounts to a reduction of 38 per cent and is to become effective on bills rendered after January 1, 1940.

SALES CONFERENCE—More than 300 utility representatives gathered at Bridgeport, Conn., last week for the General Electric sales conference on appliances and load building. Left to right—H. L. Andrews, vice-president; Charles E. Wilson, president, and C. W. Appleton, vice-president, of General Electric. At the right is a general view of the meeting during a brief intermission

1940 LINES—Manufacturers completed this week the showing of their new lines of electrical appliances. Left is Frigidaire's show at the Waldorf-Astoria in New York. (L. to r.) Ray Fox, GMAC; Carl Copp, vice-president; Lee A. Clark and E. G. Biechler, general manager of Frigidaire. Right is the Westinghouse show at the Astor Hotel in New York. (L. to r.) Frank R. Kohnstamm, sales manager; W. J. Russell, manager of engineering, and Reese Mills, manager of range and water heater department. Kelvinator in Detroit (Below, l. to r.) George W. Mason, president; W. F. Armstrong, vice-president, and Frank R. Pierce, general sales manager

Makers See Increase in Appliance Sales

Electrical appliance manufacturers completed their previews of 1940 this week and expressed opinions that sales will show a substantial increase over 1939. Sweeping improvements have been made in most lines and prices have been lowered as a result of perfected manufacturing and selling programs.

Refrigerator sales of 2,065,000 units in 1940, a 15 per cent gain over 1939, was forecast by Frank R. Kohnstamm, sales manager of Westinghouse Electric & Manufacturing Co. Prices on some models were higher and lower on others.

Kelvinator reported price reductions from $30 to $60. Frank R. Pierce, general sales manager, said the company had concentrated 96 per cent of its production on six- and eight-cubic-foot models. He expected greatly increased sales and has doubled production schedules.

Frigidaire has incorporated new economy improvements. P. M. Bratten, general sales manager, said that the "Cold Wall" is being incorporated on other models.

•

City Plant Patrons Get Christmas Gift

Customers of several municipal plants were voted Christmas gifts by the local Council in the form of bills marked "paid."

Paid-up bills for December power consumption was the Christmas gift of the Board of Public Works at California, Mo., to the 800 users of the municipally produced electricity. The action was "in celebration of the end of the first five years of operation of our municipal electric light plant." F. H. Hart, office manager for the board, said the bills totaled about $3,000.

Customers of the Village Electric Co., Sycamore, Ohio, received their December bills marked "paid." Accumulated profits made the gift possible, officials said. The village owns its own distribution system and buys energy from the Ohio Power Co. Twelve hundred consumers received the canceled bills, totaling $1,500.

For the eighth consecutive year the Board of Public Works, Gaffney, S. C., mailed all bills for electricity and water used during December marked "paid."

Having a large surplus on hand, Board of Public Affairs of Elmore, Ohio, sent out all the light and power bills for December marked "paid."

Board of Public Affairs of Risingsun, Ohio, presented a Happy New Year present to their patrons when they marked all electric bills for December "paid." This was the second time for the year 1939 that bills were returned paid to the customer.

•

Union Electric Broadcasts

Union Electric Co., St. Louis, Mo., inaugurated another series of Sunday evening broadcasts on January 7 at 6.30 p.m. over Station KMOX. The program is called "The Land We Live In."

TVA to Seek Funds for Coulter Shoals

The Tennessee Valley Authority will ask Congress to authorize construction of the $25,000,000 Coulter Shoals reservoir on the Tennessee River according to Washington reports. It is said that TVA has obtained a budget estimate for an appropriation to start the work during the fiscal year beginning next July 1.

If the budget estimate is accepted by the House appropriations committee the project faces a hard fight on the floor of the House, and probably also in the Senate. Anti-TVA members of both houses are expected to try to cut the TVA's budget for the coming fiscal years on the grounds of economy.

Coulter Shoals is the last of the series of ten dams on the main stem of the Tennessee. The nine others have already been authorized and are under construction or completed. The project, located about 40 miles below Knoxville, will provide the 9-foot navigation channel up to that city as contemplated in the original TVA Act. Ultimate power capacity is 70,000 kw.

Lehman Seeks to Develop New York Power Resources

Asks Legislature to pass a constitutional amendment to insure public development of St. Lawrence and Niagara Rivers — Recommends action on utility regulation

The New York State Legislature was called upon by Gov. Herbert H. Lehman, in his annual message last week, to pass a constitutional amendment for public development of the power resources of the state. Such an amendment, Governor Lehman said, would "insure to the people the benefits of their own property and give impetus to a comprehensive plan of publicly developed power privately distributed to every corner of the state."

Governor Lehman said that he "could not with clear conscience compromise my views on the desirability of public ownership of the state's water power resources."

Amendment Needed

Without a constitutional safeguard, the Governor said, "public power development may not be feasible." He declared that the state might not wish to embark on a program of such magnitude without assurance through constitutional provision that the project will not at some future time fall into private hands and be exploited for private gain. It was expressed that the St. Lawrence and Niagara Rivers should be developed and the "spectre of further alienation of the people's water power resources should be permanently laid at rest."

Governor Lehman pointed to the extension of rural service where the farmer's minimum bill has been cut from $6 to $3 and in many cases to $2 and where 7,000 miles of rural lines have been built, bringing service to 21,500 farms previously unserved. It was stated that development of St. Lawrence and Niagara Rivers would give to New York the benefits similar to what has happened on the Canadian side. Great industrial development and economic advancement were visioned with the development of the water power resources.

Recommendations were made by Governor Lehman that action be taken on his proposals regarding the utility industry.

For the fourth year, he said, "I have recommended that the Public Service Commission be empowered to require utility company books to show depreciation as well as original cost. For three years I have urged that the commission be authorized to regulate the rates charged by sub-metering companies. In addition I have pointed to the necessity of eliminating duplicate accounting and the consumer's choice of varying rate schedules."

Depreciation

The setting up of depreciation reserves, Governor Lehman said, is one of the essential steps in determining how much the utility companies may charge the consumer for the use of electric current. "If sub-metering companies, having purchased current at reduced rates, are to be forced to pass the reduction on to the housewife, the Public Service Commission must be authorized to regulate them."

Governor Lehman said that the law compelling a public service corporation to offer a consumer only one rate, the proper one, will protect the inexpert citizen from the necessity of making a choice among different complex rate schedules. He declared that it will place the responsibility for fixing the proper rate "on utility experts, where it belongs."

"To prohibit the utility companies from keeping two sets of books will make certain that the rates charged consumers will be warranted by the actual instead of a fictitious financial condition of the company," he declared.

•

TVA Appropriation Set at $40,000,000

An appropriation of $40,000,000 to finance the Tennessee Valley Authority for the next fiscal year was recommended to Congress by President Roosevelt in the budget.

Largest item in the estimate was $15,423,000 to continue construction of the Kentucky Dam and reservoir at Gilbertsville, Ky., on which an estimated $11,722,000 will be spent during the current fiscal year ending next June 30.

It is estimated that $14,888,000 will be needed to continue construction of Watts Bar Dam and $1,000,000 to build an access road, a construction plant and employee housing facilities for Coulter Shoals Dam and reservoir, the last of the ten dams contemplated in the TVA program.

Other expenditures in the budget included $774,000 for Pickwick Landing, $138,000 for Wilson, $2,068,000 for Wheeler, $80,000 for Guntersville, $681,000 for Hales Bar, $1,213,000 for Chickamauga, $752,000 for Hiwassee and $752,000 for Norris.

Mr. Roosevelt stated that the appropriation request for the 1941 fiscal year, together with $3,300,000 expected to be spent from bond issue proceeds, "will finance the net estimated obligations of $43,300,000."

•

U. S. Group Discusses St. Lawrence Treaty

A delegation headed by A. A. Berle, Jr., Assistant Secretary of State, was in Ottawa this week to confer on a treaty with Canada for the development of the St. Lawrence-Great Lakes waterway and hydro-electric project. Associated with Mr. Berle were Leland Olds, new chairman of the Federal Power Commission, and John D. Hickerson, assistant chief of the European division of the State Department.

For some time informal discussions have been carried on between the Washington and Ottawa governments and it is expected that the treaty will be concluded in the near future.

Plans for the development provide for construction of a deep-water canal around the International Rapids and construction of a power dam in the rapids. If built on the Canadian side, the canal would be constructed by Canada, but financed by the United States. The power dam would be built and paid for by the United States, but the power plant superstructure would be built and paid for by Canada. It is estimated that 1,100,000 hp. will be developed. This would be kept in control of the United States.

•

Electric Cooking Council Names Contest Winners

H. M. Kemmer, Appalachian Electric Power Co., Huntington, West Va., won first prize of $100 for his entry in the national essay contest conducted by the Commercial Electric Cooking Council. A. S. Nissen, Wisconsin Michigan Power Co., Iron Mountain, Mich., won second prize of $50; William B. Shenk, Virginia Public Service Co., Charlottsville, third prize of $25; George E. Schraudt, Jr., Florida Power Corp., St. Petersburg, fourth prize of $15, and Clem Antonetti, Wisconsin Michigan Power Co., Appleton, Wis., fifth prize of $10. Honorable mention was given to thirteen other contestants.

New Power Approach Seen in Naming Wirtz

Appointment of Alvin J. Wirtz, general counsel of the Lower Colorado River Authority, as Under-Secretary of the Interior recently indicates a new approach to the problem of the disposition of power from Bonneville Dam and other power projects under the department's jurisdiction.

It was Mr. Wirtz who last year worked out the highly satisfactory contract between the Texas authority and Texas Power & Light Co. for the sale of surplus power from the $28,000,000 "Little TVA" development in central Texas. This contract averted a threatened power fight in the area and received high praise from the utility industry.

Whether this policy will be projected into the Bonneville situation was a subject of speculation in Washington as the Texan assumed his new post and as Secretary Ickes announced that the Bonneville Administration would be assigned to the Under-Secretary's office, for the first time. Heretofore Bonneville affairs have been unassigned to any subordinate official of the department.

The Reclamation Bureau will also come under Mr. Wirtz's supervision, it was announced.

•

Court Upholds Tax Law Exempting City Plants

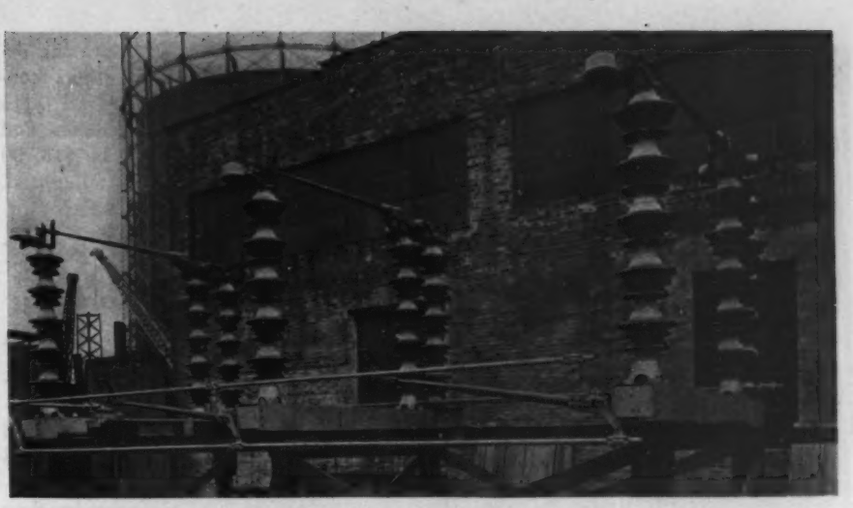
Constitutionality of the new Indiana law exempting city-owned utilities from taxation, except as to gross income tax, has been upheld by the state supreme court. The Supreme Court affirmed a ruling of the Circuit Court at Crawfordsville to the effect that the part of the Crawfordsville municipal plant used for private domestic and commercial purposes was exempt from taxes the same as that part used by the city government.

The opinion also said that the 1938 taxes placed on the plant need not be paid, even though the exemption act of 1939 was passed after the 1938 taxes were assessed. Since the purpose of municipal plants is governmental, there can be no constitutional objection to their tax exemption, the court said.

•

Sets $3,500,000 Budget

Kansas City Power & Light Co. budget for 1940 contemplates the expenditure of $3,500,000, an increase of about $500,000 over 1939. Principal item will be a new turbine for the Northeast power plant, installation of which is to be completed in May. The new turbine will have a capacity of 42,500 kw.



BONNEVILLE SWITCH—One of the six 196-kv. switches for the North Bonneville switching station set up on a temporary structure outside the Memco Engineering & Manufacturing Co. plant for checking the operating mechanism

•

Names Beck PUD Manager

Grays Harbor County utilities commissioners have unanimously elected Robert W. Beck, former Bonneville engineer, as PUD manager at a salary of $500 a month. Mr. Beck was largely responsible for fixing the valuation at $2,842,000 as a fair figure for the purchase of the electric facilities from Grays Harbor Railway & Light Co., subsidiary of Federal Light & Traction.

•

Examines Utility Books

A major obstacle to PUD acquisition of Puget Sound Power & Light Co. properties in the Puget Sound area has been removed by allowing the PUDs to examine its books. Several districts have started condemnation proceedings against the utility.

Egan and Boehm Quit

Louis H. Egan, former president, and Frank J. Boehm, former executive vice-president, of Union Electric Co. of Missouri, have broken all connections with the company, according to Dr. William McClellan, president. They are giving up the $1,500 a month salaries they were to have received beginning January 1. They were retained by the company pending further developments in the SEC investigation. Hermann Spoehrer, secretary and director, also resigned.

Ship Switches for Use At Bonneville Project

Ten giant switches and operating mechanism, weighing in excess of 30 tons, have been shipped for installation at Bonneville by Memco Engineering & Manufacturing Co., Inc., Long Island City, New York. There were six switches with a 196-kv. normal voltage shipped to the North Bonneville switching station and four with a 115-kv. normal voltage for North Vancouver substation.

It was stated that these are the latest design rotating insulator type with modern high-pressure contacts. These 600-amp., three-pole group-operated disconnecting switches will be used for isolating oil circuit breakers on the 115-kv. and 230-kv. ground neutral lines of the Bonneville project transmission system and for sectionalizing such transmission lines after they have been de-energized.

•

Union Electric Official Guilty on Perjury Charge

Frederick J. Martin, sales engineer for the Union Electric Co. of Missouri, was taken to the St. Louis city jail on January 3 to begin serving the six-month sentence imposed upon him when he pleaded guilty before Federal Judge Moore to a charge of perjury growing out of testimony given before an investigator of the Securities and Exchange Commission, which has been inquiring into the business and political practices of the utility.

In addition to the jail sentence, the court fined Mr. Martin $501, imposing a fine of $500 on one of two counts and a fine of $1 on the other. The sentence of six months was fixed for each of the two counts, but will run concurrently.

Finds Permanent Jobs for Temporary Workers

Fifteen salesmen hired by the Nebraska Power Co. October 1 for a special 90-day job were released on January 1, but through the assistance of the company all will have found new jobs.

Through a 70-inch advertisement published January 1 in the Omaha *World-Herald* and by announcements over Omaha's three radio stations a veritable flood of offers from Omaha business firms was released.

The men had been hired by the power company to augment its regular sales staff following reductions in its electric service rates. They were sent to tell customers about these rate reductions and explain how much more electric service was now available at no added cost. Mrs. B. E. Marsh, residential sales manager, in commenting on the response to the company's ad, said: "I'm thrilled with the results. I never dreamed the response would be so great or so immediate."

•

Power Sales Conference to Be Held in Spring

The annual power sales day, normally held during the annual sales conference of the commercial section of the Edison Electric Institute, will form a separate conference this year and be held some time late this spring.

The sales conference will be held during the week of March 18 in Chicago at the Edgewater Beach Hotel. Two days will be set aside for individual committee sessions with the regular open session to start Wednesday morning. Harris E. Dexter, vice-president of Central Hudson Gas & Electric, is chairman of the committee.

•

E.E.I. Wiring Booklet

The wiring committee of the Edison Electric Institute has released in booklet form the result of a recent study of modernization of commercial buildings. The booklet describes methods and materials which greatly simplify rewiring operations at an appreciable reduction in cost.

•

Offer $200,000 in Awards

A 2½-year program of scientific study which will culminate in payment of $200,000 in awards is being sponsored by the James F. Lincoln Arc Welding Foundation. There will be 458 awards offered for studies speeding the benefits of industrial progress by improving designs, manufacture, fabrication, construction and maintenance of all types of machines, building, structures and products. First award will be $13,700 for the best progress report submitted.

•

Inland Empire to Hold Washer-Ironer Month

February will be home laundry equipment month in the Inland Empire. Believing that promotional efforts entered into by the utility and all dealers will stimulate business, the utility and dealers have planned an empire-wide effort to sell laundry equipment in February.

Of interest are two dealer contests to determine who can devise the most novel and effective means of stimulating sales in ironers and who will devise the most attractive ironer window. Laundry demonstrations on the sidewalk, old-fashioned window displays, boy scout troops and parades will probably bid for the contest prizes, which have been named as two souvenir desk sets.

MEETINGS

Canadian Electrical Association—Annual winter conference, Montreal, Que., January 15-16. B. C. Fairchild, secretary, 804 Tramways Bldg., Montreal.

Pennsylvania Electric Association — Hydraulic power committee and systems operation committee with the Weather Bureau, Shoreham Hotel, Washington, D. C., January 19-20.

American Society of Refrigerating Engineers — Annual meeting, Cleveland, Ohio, January 22-26.

American Institute of Electrical Engineers—Winter convention, New York, N. Y., January 22-26. H. H. Henline, national secretary, 33 West 39th St., New York, N. Y.

American Society of Heating and Ventilating Engineers—Annual meeting and International Heating and Ventilating Exposition, Lakeside Hall, Cleveland, Ohio, January 22-26. Charles F. Roth, president International Exposition Co., Grand Central Palace, New York.

International Association of Electrical Inspectors —Annual meeting, Illinois chapter, Western section, Hotel Sherman, Chicago, Ill., January 25-26.

Iowa Public Utilities Association—Annual sales and distribution school, Hotel Fort Des Moines, Des Moines, Iowa, January 29-30. Herbert Henderson, secretary, Security Building, Cedar Rapids, Iowa.

Edison Electric Institute—Prime movers committee, Detroit, Mich., February 5-6; electrical equipment committee, Netherlands-Plaza Hotel, Cincinnati, Ohio, February 12-13.

National Electrical Manufacturers Association—Mid-winter Conference, Waldorf-Astoria Hotel, New York, N. Y., February 5-9. W. J. Donald, managing director, 155 East 44th St., New York, N. Y.

American Institute of Mining and Metallurgical Engineers — Annual meeting, February 12-15, New York, N. Y. A. H. Parsons, secretary, 29 West 39th St., New York, N. Y.

Missouri Association of Public Utilities—Annual convention, Elms Hotel, Excelsior Springs, Mo., April 17-19. Jesse Blythe, assistant secretary, Merchants Bank Bldg., 101 West High St., Jefferson City, Mo.

Electrochemical Society—Spring meeting, Galen Hall, Wernersville, Pa., April 24-27. Dr. Colin G. Fink, secretary, Columbia University, New York, N. Y.

Held Cooking Parties at Christmas Time

Christmas cooking parties conducted by Shirley Ochs, home service adviser with the Washington Water Power Co., in Chelan, were the most successful events of this kind ever held in the Okanogan district. The parties were attended by 268 people, who heard about mixing favorite recipes and the more economical use of electricity in cooking. Given at a time when people are cooking and buying, the schools were planned to suggest practical, time-saving electrical appliances as Christmas gifts. A full Christmas dinner was prepared in the evening with improved methods and appliances.

Both dealers and the utility displayed appliances of all kinds around the stage, with Mrs. Ochs commenting on each appliance. The prepared food was given away as prizes.

•

W. Paxton Little Dies

W. Paxton Little, one of the pioneers in New York State electric power service, died January 7, at the age of 73, at the home of his daughter, whom he was visiting in Los Angeles, Calif. Mr. Little retired as treasurer of Niagara Hudson Power Corp. at the close of 1938. He had also served as vice-president since 1926.

•

Rufus C. Dawes Dies

Rufus C. Dawes, utility executive, banker and civic leader and brother of former Vice-President Charles G. Dawes, died January 8 at his home in Chicago, at the age of 72. In the course of his distinguished career Mr. Dawes organized and managed various electric light and gas companies in the Middle West. He served as president of the Century of Progress Exposition held in Chicago in 1933-34.

•

Elect Officers for 1940

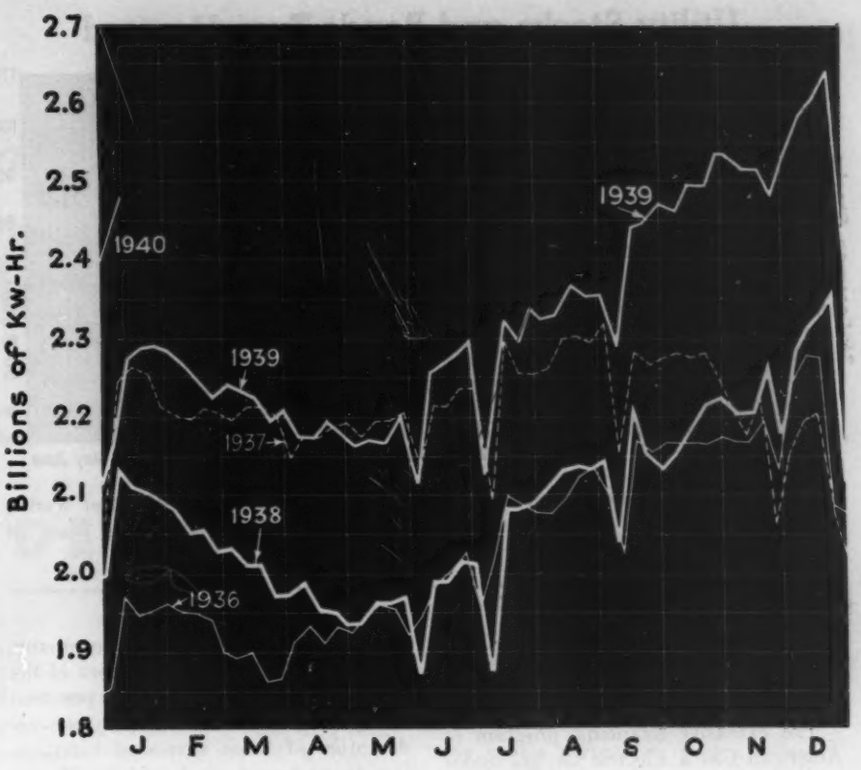
At the annual election of officers by the board of governors of the Electrical Association of Philadelphia, A. L. Hallstrom was elected president for 1940. This will be the second term for Mr. Hallstrom, who is Atlantic district manager, Graybar Electric Co., Inc. Other officers elected were: Vice-president, H. L. Miller, president Utilities Engineering Co.; treasurer, Philip H. Ward, Jr., president Ward Electric Co.; secretary, Robert J. Moran, chief of electrical department, Middle Department Rating Association.

Output Starts Year 14.0% Above 1939

Rebounding from the sag registered in Christmas week the output of the electric light and power industry in the week ended January 6, as reported by the Edison Electric Institute, rose to 2,473,397,000 kw.-hr.; the gain over the corresponding period a year ago increased to 14.0 per cent—the largest since the beginning of November—against an average of 11.5 per cent in the four weeks preceding the holidays.

Since the week included New Year's Day, operations were necessarily at a lower level than in the recent full working weeks, but it is to be noted that the output was only 168,000,000 kw.-hr. under the December peak, compared with 194,000,000 kw.-hr. a year ago.

The outstanding region in terms of year-to-year gains continues to be the Central Industrial. It now stands at 18.1 per cent. Its average for the last quarter was 16.2 per cent. Next comes the South, with 13.5 per cent and a quarterly average of 12.7 per cent. In the Mountain region recent low figures have been replaced by 12.2 per cent in the latest week.



Weekly Output Millions Kw.-Hr.

1940		1939		1938	
Jan. 6	2,473	Jan. 7	2,169	Jan. 8	2,140
	1939		1938	Jan. 1	1,998
Dec. 30	2,404	Dec. 31	2,121		1937
Dec. 23	2,641	Dec. 24	2,363	Dec. 25	2,085
Dec. 16	2,605	Dec. 17	2,333	Dec. 18	2,202
Dec. 9	2,586	Dec. 10	2,319	Dec. 11	2,196
Dec. 2	2,539	Dec. 3	2,286	Dec. 4	2,153

Per Cent Change from Previous Year

	Week Ending		
	Jan. 6	Dec. 30	Dec. 23
New England	+9.5	+10.2	+10.3
Middle Atlantic ...	+11.8	+11.0	+ 8.1
Central Industrial..	+18.1	+16.9	+15.8
West Central	+11.3	+10.2	+ 7.8
Southern States	+13.5	+12.1	+12.0
Rocky Mountain ...	+12.2	+10.0	+ 3.3
Pacific	+10.3	+ 8.6	+ 8.9
United States	+14.0	+13.4	+11.8

November Output Up 13.4% Over Year Ago

With the production of 11,456,100,000 kw.-hr. for public use during November a new record for the month was established, 13.4 per cent higher than a year ago, as well as a new average daily maximum 1.4 per cent above that of October, the Federal Power Commission reports. In addition, 197,606,000 kw.-hr. was generated in electric railway, electric railroad and other plants producing energy principally for their own use, making a total production reported to the Commission for November of 11,653,706,000 kw.-hr.

Of the output for public use 3,188,244,000 kw.-hr., or 28.8 per cent, came from water power. This was 9.5 per cent less than in November, 1938, whereas production from fuels increased 25.6 per cent. Thus hydro-electric energy continues to be unusually small. Corresponding year-to-year changes in October were a decrease of 7.7 per cent in hydro, an increase of 27.7 per cent in energy from fuels and of 15.8 per cent in total.

Average daily production from fuels in November, 275,000,000 kw.-hr., was almost equal to that of the preceding month, despite the effect of the Thanksgiving holiday or holidays.

Fuel consumption included 4,462,710 tons of coal, 1,593,846 barrels of fuel oil and 15,547 millions of cubic feet of natural gas.

The F.P.C. states further that the capacity of generating plants reported to be in use in the United States on November 30, 1939, was 40,295,000 kw.

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NYA Marks REA Poles

As of November 1, the REA reported that 50,960 miles of poles had been marked, of which more than 95 per cent had been done by the National Youth Administration. An average of seven poles to the mile are marked with aluminum identification numbers.

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Bonneville Power Contract

The city of Monmouth, Ore., has entered into a 20-year agreement with the Bonneville Power Administration for purchase of 400 kw. of energy. Delivery of power will begin as soon as the city has acquired or purchased a distribution system. Negotiations with the Mountain States Power Co. for purchase of the system within and adjacent to Monmouth are now in progress.

•

Oppose PUD Proposal

The cities of Sandy and Molalla have voiced opposition to the organization of the proposed people's utility district in Clackamas County. The two cities preferred to remain customers of Portland General Electric Co. It was stated that if there is any profit in municipal ownership the cities wanted to own their own systems.

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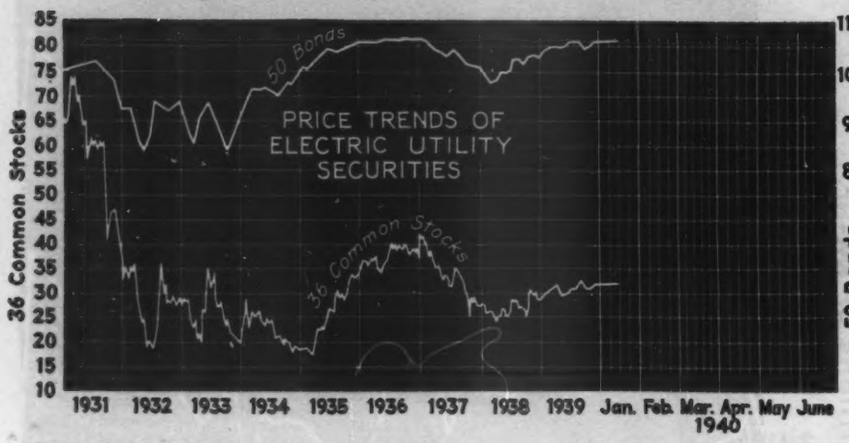
Output Hits New High

Central electric stations in Canada during November created a new monthly record by producing 2,606,821,000 kw.-hr., compared with 2,589,956,000 kw.-hr. in October, the previous high output, the Dominion Bureau of Statistics reports. In November last year the output amounted to 2,375,196,000 kw.-hr. Exports to the United States declined to 155,246,000 kw.-hr. from 165,299,000 in November last year.

Utility Stocks and Bonds Turn Upward


50 Bonds
PRICE TRENDS OF ELECTRIC UTILITY SECURITIES
36 Common Stocks
36 Common Stocks
50 Bonds
85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10
110 100 90 80
1931 1932 1933 1934 1935 1936 1937 1938 1939 Jan. Feb. Mar. Apr. May June 1940

Utility stocks withstood the downward trend of the market this week. "Electrical World" index 32.3, last week 32.7; last year, 29.7. Mixed price movements in the bond list carried "Electrical World" index to 106.3; last week 106.1

American Gas Puts Issues on Market

The extensive financing program of American Gas & Electric Co. got under way this week with the public offering of $30,000,000 of sinking fund debentures through a nation-wide underwriting group and the simultaneous offering by the company of 355,623 shares of 4¾ per cent cumulative preferred stock under an exchange offer. The preferred stock offering is being underwritten by the same group.

Debenture offering consisted of three series—$8,000,000 of 2¾s, due 1950, priced at 102½; $10,000,000 of 3½s, due 1960, priced at 103½ and $12,000,000 of 3¾s due 1970, priced at 103½, each bearing a sinking fund sufficient to retire each issue by maturity. The public offering price of the preferred stock was $105 per share and accrued dividends from January 1.

Under the company's offer, holders of outstanding $6 preferred stock have the privilege of exchanging their stock on a share for share basis, plus a cash payment equal to the difference between the redemption price of the old preferred stock and the initial public offering price of the new stock.

A limitation on the common stock dividends which may be paid by the company was imposed by the SEC when it approved the company's new debenture and preferred stock offerings. The limitation, to which the company agreed, provides that as long as any new 4¾ per cent preferred stock is outstanding company will pay no common stock dividend, if, after payment of the dividend, common stock and surplus would aggregate less than $44,827,377.

Net proceeds from the sale of debentures and preferred stock, together with treasury funds of the company, will be applied to the retirement of the $30,000,000 of outstanding 5 per cent debentures, due 2028, and to the redemption of those shares of outstanding $6 preferred stock which will not have been acquired by the company under its exchange offer, while preferred stock acquired by the company under its offer will be canceled.

•

Approve Capital Changes

Shareholders of Jamaica Public Service, Ltd., at a special meeting on January 8 ratified a proposal of the directors for the division of the capital stock of the company on a three for one basis. The vote was unanimously in favor of the plan. The capital change will increase the authorized no par capital stock from 60,000 shares to 180,000 shares and the issued capital from 45,000 shares to 135,000 shares.

•

Defer Interlocking Hearing

Federal Power Commission has ordered postponement of public hearings in thirteen matters involving interlocking positions of officials in the Union Electric Co. of Missouri and its subsidiaries, all of which are subsidiaries of the North American Co., from January 8 to a date to be fixed by the commission.

•

Joint Note Issue Effective

SEC has made effective a joint declaration by the Lexington Utilities Co. and the Kentucky Utilities Co. regarding the issue and sale by the former company of $4,000,000 of 3½ per cent secured notes to the Chase National Bank of the City of New York guaranteed by the latter company. Proceeds will be used to redeem outstanding securities.

•

Utilities File Pleas with Federal Board

Pennsylvania Water & Power Co. has filed with the SEC a registration statement covering $10,962,000 of refunding mortgage and collateral trust bonds, 3¼ per cent series due 1970. Net proceeds from the sale will be applied together with other available funds of the company to the redemption on or about March 1, 1940, of $10,962,000 of first refunding mortgage gold bonds, Series B, 4½ per cent, due March 1, 1968.

NY PA NJ Utilities Co. has filed with the board an application for approval of the acquisition of $8,594,100 of securities of subsidiary and associated companies. The securities are to be obtained from the Metropolitan Edison Co., Staten Island Edison Co., Associated Investing Corp., Associated Power Corp., General Utility Investors Corp. and the Southeastern Investing Corp. for $8,062,550. None of the securities carries voting power or is convertible into voting securities.

In view of the immediate need for the Narragansett Electric Co. of $3,220,500 for payment of interest on bonds, this amounting to $620,500 and of bank loans aggregating $2,600,000, the SEC expedited its disposal of the company's declaration covering the proposed issuance of $5,000,000 of promissory notes in the measure necessary to meet these current obligations.

•

Hartford Case Postponed

By request of counsel for both the Hartford Electric Light Co. and the Federal Power Commission, the hearing in the matter of the Hartford Electric Light Co., which was set to be resumed on January 8, has been postponed.

Utility Reports

	Net Income 1939	1938
*American Power & Light and subs.	$10,223,964	$9,768,050
*Central Maine Power	2,007,402	1,750,672
*Commonwealth & Southern and subs.	13,232,865†	10,097,409†
*Connecticut Light & Power	4,190,428	3,840,016
*Consolidated Gas Elec. Lt. & Pwr. (Balti.)	6,739,026	5,739,063
*Electric Power & Light and subs.	4,335,769	4,418,657
*Louisville Gas & Electric (Ky) and subs.	2,837,717	2,597,606
*Northern Indiana Public Serv.	2,321,825	1,834,407
*Northwestern Electric	584,765	487,520
*Pacific Power & Light and sub.	911,023	859,929
*Public Service of New Hampshire	1,209,342	935,336
*Wisconsin Public Service and sub.	1,589,376	1,349,356

*Twelve months ended November 30.
†Tennessee Electric Power Co. and Southern Tennessee Power Co. have been eliminated.

QUESTION:

Can You Name

5 IMPORTANT

WIRE AND CABLE DEVELOPMENTS MADE IN 1939?

★ ★ ★

ANSWER:

1. **FORMEX** Magnet Wire
2. **THINWOL** Control Cable
3. **NO. 1799** Varnished-cambric Cable
4. **GAS-FILLED** Paper-insulated Cable
5. **NEW LEAD-SHEATHING PROCESS**

CREDIT 1939 with being an outstanding year for insulated cable. More important G-E cable developments were brought to successful conclusion than in any other year that we can recall. These developments deserve attention for the savings, improved safety, and other far-reaching benefits that they make possible.

1. FORMEX

FORMEX identifies a new G-E magnet wire that consists of a copper conductor coated with a high-quality insulating film of synthetic resin. In addition to excellent electrical characteristics, Formex magnet wire has outstanding mechanical properties. It is remarkably strong, tough, and flexible, and needs no additional protective covering. It can be wound at very high speeds, and utilizes coil space to the maximum advantage. Thus, it offers many opportunities for making improvements in the design of electric equipment.

2. THINWOL

THINWOL is a new 85-per-cent new-rubber insulated cable for fire-alarm, traffic-signal, supervisory, and other multiconductor control circuits. This new insulation has a guaranteed tensile strength of 3500 lb per sq in.; average test results show 5250 lb per sq in. An insulation thickness of 0.015 inch will stand a test of 1500 volts. Therefore, the cable can be made with very thin walls—thus saving space—and still having an increased factor of safety.

3. NO. 1799 CAMBRIC

This is a new varnished-cambric cable that has added heat resistance. The cable can be run at a conductor temperature of approximately 10 deg C higher than the former G-E design. Of course, this means savings in copper, in overall diameter, in weight, in duct space, and in first cost.

4. GAS-FILLED CABLE

This development was announced in a paper presented at the A.I.E.E. winter meeting in New York on January 26, 1939. Gas-filled cable offers many advantages over other types of cable in the voltage range from about 15,000 to 33,000 volts. While this development is still considered somewhat in the experimental stage, the results from the systems now installed continue to prove the accuracy of design calculations.

5. NEW LEAD-SHEATHING PROCESS

This process has been in successful use for some considerable time. It represents, we believe, one of the most far-reaching steps ever taken to improve the quality of lead sheath particularly on paper-insulated cable.

Additional information on some of these developments is contained in the *G-E Review*, January, 1940. Other details can be obtained from a G-E cable specialist through the nearest G-E sales office. General Electric, Schenectady, New York.

GENERAL ELECTRIC

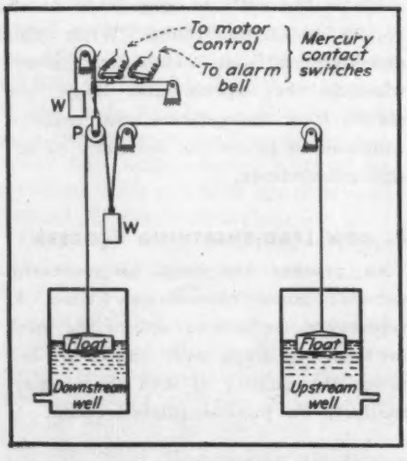
OPERATING PRACTICES

Simple Device Warns of Water-Level Difference

By E. A. CRELLIN
Assistant Engineer of Maintenance
Pacific Gas & Electric Company,
San Francisco, Calif.

A simple differential-float arrangement is employed by Pacific Gas & Electric Company at Wise power house to operate clearing mechanisms on trash racks and to sound an alarm if the difference in water levels continues to increase. The device is independent of normal water level, which may vary, depending on flow in the canal.

The arrangement consists of a group of weights in static equilibrium. Accumulation of débris on rack bars will cause the downstream water level to drop with reference to the upstream level. As is apparent in the accompanying illustration, the resulting change in relative positions of the floats will cause the floating pulley P to lower in order to maintain balance. This causes the arm carrying mercury-contact switches to move downward.



When water levels change together no movement of the arm occurs. As difference in water levels increases the arm moves, causing mercury-contact switches to close

When the predetermined differential has been reached the first mercury contact closes, starting the trash rake to remove the obstruction. Should the rake fail to function, or should the differential continue to increase for any other reason, the further motion of the arm will close the second mercury contact, thus sounding an alarm to warn the operator that the apparatus must be inspected.

Recently a large limb of a tree fell into the canal, lodged against the rack bars and caused the safety pin on the rake-driving mechanism to shear off. When the downstream water level continued to drop, the alarm was sounded and inspection and repairs followed.

Operation of the device has been entirely successful. It has the merit of being inexpensive to build and to maintain.

•

Distance Meter Aids Rural Line Design

Considerable surveying expense in connection with laying out rural extension lines is saved by this distance-measuring device designed and built by engineers of the Northwestern Electric Company, Portland, Ore. In areas where customer density is low and the potential business meager, at best, any such saving is especially appreciated. With the device one man may run over such an area and take down all essential distances to an accuracy of within one-tenth of 1 per cent at a speed of 15 m.p.h.

Readings of running-board-mounted distance meter are taken from driver's seat

The device was made from a 20-in. bicycle wheel and forks and a rebuilt, station-type, watt-hour meter register. By means of a cable and suitably proportioned gears revolutions of the wheel are recorded in feet on the meter register, which is easily read from the driver's seat. In addition to the four conventional meter registers, indicating 100, 1,000, 10,000 and 100,000 ft., there is a dial about 6 in. in diameter covering the meter face, large enough to be read down to distances of one foot and less. The indicating dial of this hand makes one complete revolution in 10 ft. of travel of the car. All dials may be returned to zero by means of a set-back mechanism.

The bicycle wheel and its fork are attached to an arm from a platform which sets on the running board of the car and is held there with two bolts and wing nuts. The wheel runs on the ground approximately in line with the rear wheels of the car, positive contact with the ground being

Unusual Test

On Eastern Utility System Proves Value of Capacitors

Power Company Gained 3300 kva of Needed System Capacity for Only $12.85 per kva

OW THE TEST WAS MADE

o find exactly what effect was obtained om 5520 kva of G-E Pyranol capacitors stalled to relieve its system of reactive va, a large Eastern utility recently made system-wide test involving every one of s 51 separate capacitor installations.

inemen were stationed at each installaon, and at a prearranged time all of the apacitors were disconnected from service or a period of 10 minutes. Station and ubstation attendants took the readings ecessary to determine the increase in va of system load with the capacitors isconnected.

WHAT THEY FOUND

y tabulating the readings, the power ompany engineers found that system va loading jumped 3300 kva when the apacitors were taken out of service. n other words, each capacitor kva in ervice was releasing 0.6 kva of system apacity for revenue production. On the asis of the total installed cost of $7.71 per kva for the capacitors, this meant that the power company obtained needed system capacity at the remarkably low cost of $12.85 per kva.

OTHER ADVANTAGES OF CAPACITORS

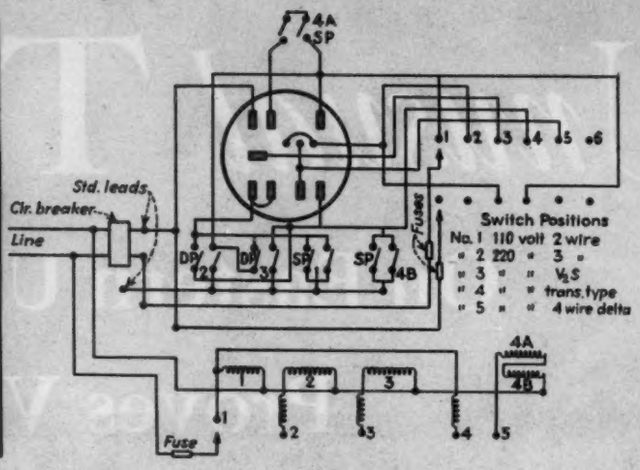
In the careful study that preceded this installation, the power company engineers found that other factors besides low cost favored the selection of capacitors. For example, capacitor kva could be installed in small or large blocks at strategic locations to obtain the maximum benefit for the dollar invested. Capacitors could be installed easily and quickly — in this case, only 14 working days were required.

CAPACITORS PROFITABLE FOR YOU?

On your system—probably in a number of locations—lie opportunities for the profitable application of G-E Pyranol capacitors. They help, at low cost, to solve the problem of increasing feeder, substation, and generating capacity, with better regulation and lower losses. It will pay you to investigate this economical, reliable means of gaining capacity. Ask your G-E representative about Pyranol capacitors or write for Bulletin GEA-2746, "Pyranol Capacitors for Central Station Applications." Address General Electric Co., Dept. 6A-201, Schenectady, N. Y.

GENERAL ELECTRIC

360-150



Customer's socket is bridged and power is furnished to the test board on the truck merely by replacing the customer's meter with a plug. Meter is then plugged in test board. Wiring diagram shows connections

maintained by a coiled spring. Variable factors which affect the registration, such as tire inflation, have been compensated for.

Vance Hook, Washington district engineer, pointed out the need for such a register to eliminate surveying expense along roads. The device then was designed and built in the company's meter shop by E. J. Singrey and Ralph Worth, under the supervision of Owen Hurd of the engineering department.

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Socket-Meter Tests Simplified

By H. H. TUREMAN, L. F. HAYWORTH
Southern Colorado Power Company, Pueblo, Colo.

By applying the plug-in feature of the socket-type meter to the field testing of the meter itself Southern Colorado Power Company was able to devise a portable test set which greatly simplifies the job. The scheme eliminates the delay of making connections and twisting thumb screws, largely eliminates the use of ladders, puts supplies and standard control within easy reach of the test man and places the meter at a convenient height for observation and adjustment.

The equipment consists of a test board mounted on the inside rear door of the truck body. With the standard connected through three flexible leads to terminals on the front of the board, all that is necessary to test any one of the five most common forms of meter on this system is: (1) To transfer the customer's meter to the socket on the test board; (2) to insert a special plug in the customer's socket; (3) to turn a selector switch to the position corresponding to the type of meter under test.

The plug restores the customer's service and connects leads from the test board to the source of power. The selector switch is wired to connect these types of meters: Two-wire, 110-volt; three-wire, 220-volt; 220-volt V-2-S, 220-volt current transformer, and 220-volt, four-wire delta.

•

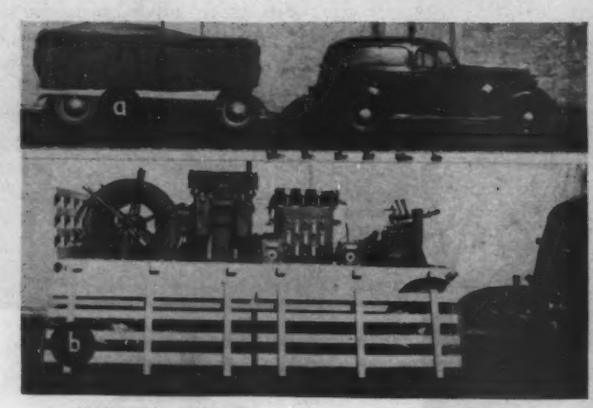
Is 4-Wire Isolated Service Less Costly?

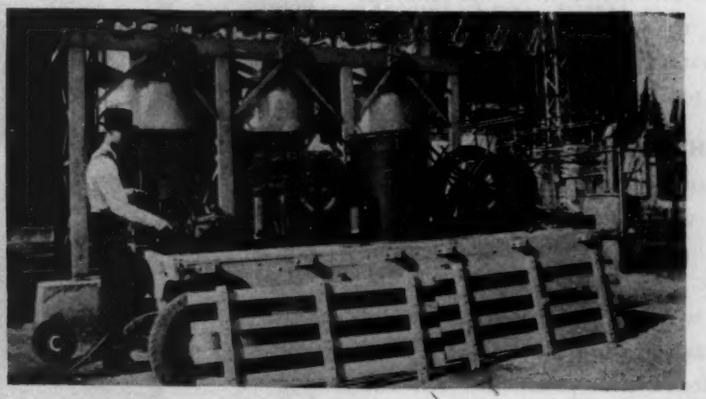
By J. A. POTTS
Wisconsin Electric Power Company

The question is sometimes raised regarding the advisability of supplying isolated customers, such as schools, hospitals, etc., with four-

*Abstract of paper Wisconsin Utilities Association.

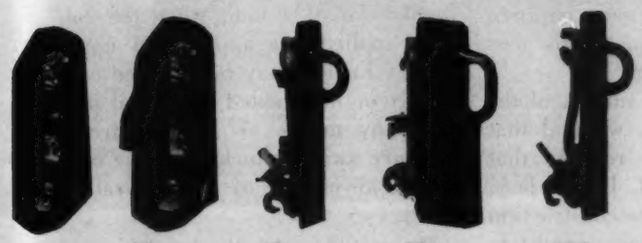
Relay Test Truck and Trailer





A truck accompanied by a trailer carrying the over-all test equipment facilitates relay testing for the Empire District Electric Company. At (a) is shown the test set-up ready to go out on the job. Reels carrying low- and high-voltage cables may be seen at (b), together with a 6,900/2,300-115/230-volt transformer (rating 75 kva. for five minutes) with primary cut-outs, high-current testing transformer with a maximum secondary current rating of 3,750 amp. at 20 volts and, finally, the oil switch for control of test set. Operator carries out a field test at (c); voltage regulator consists of an old single-phase motor reconnected as an induction regulator.

WE'VE BEEN TELLING YOU THIS—



50 amp 5 kv | 50 amp 7.5 kv | 50 amp Single-element | 50 amp Two-element reclosing | 100 amp Disconnect

2 HOUSINGS AND 3 DOORS MEET 80% OF YOUR CUTOUT REQUIREMENTS

Now FOR THE OTHER 20%

—here's a 100-ampere line with a new 2-element reclosing door

As long as we have been in the cutout business, we've never been able to offer a better, more complete line of enclosed, expulsion-type, fuse cutouts—and doors that are interchangeable, which makes possible true flexibility of cutout application.

The G-E 100-amp line—now made complete with a 2-element reclosing door—enables you to cut costs still further, by lower inventories, and fewer parts to handle in the stock room and on your trucks. Now, you can get a single-element door or a 2-element reclosing door or a disconnect door—all in both the 50-amp and 100-amp lines.

Two housings and three doors is General Electric's way of helping you cut costs through flexibility of cutout application. The new 100-amp recloser is completely described in a new supplement to bulletin GEA-2707. Ask our nearest sales office for a copy. General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

wire service from a bank of transformers in a vault on the premises. First hand, one might expect that economy would favor the four-wire plan. However, on investigation one will find that as a rule the costs are so close together that individual features of the job are likely to throw the balance in either one direction or the other.

The substation costs, which include the transformers and secondary metering equipment, are likely to favor the four-wire plan. For instance, take a typical load of 300 kva. consisting of 225 kva. of single-phase load and 75 kva. of three-phase load, this to be supplied from a 2,200/3,810-volt primary distribution system. Let us assume that for the four-wire plan three 100-kva. transformers would be used, while for the conventional plan one 75-kva., three-phase transformer and three 75-kva., single-phase transformers would be used. Each of the single-phase transformers would be connected to a different phase of the primary supply. An estimate of the costs and the room sizes is as follows:

	Four-Wire Three-Phase Plan	Conventional One-Phase and Three-Phase Plan
Substation equipment	$2,655	$3,034
Metering equipment	351	540
Service switch or switches	1,018	251
	$4,024	$3,825
Required room size	17' 6" x 9' 3"	19' 6" x 9' 3"

The saving in substation and metering equipment for the four-wire plan will be noted in the above figures. However, this is more than offset by the higher cost of service switch. This is because the four-wire plan requires a main service breaker, whereas in the other scheme four conventional service switches could be used. If breakers were required in the conventional plan this cost would then run higher.

Now going into the subject of the interior wiring layout, we find that no conclusion can be reached that either plan is cheapest. I have been unable to find a definite construction project that had been completely laid out and estimated both ways. However, estimates of some typical plans do not seem to show any decided advantage one way or the other.

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Compact High-Voltage Fault-Locating Truck

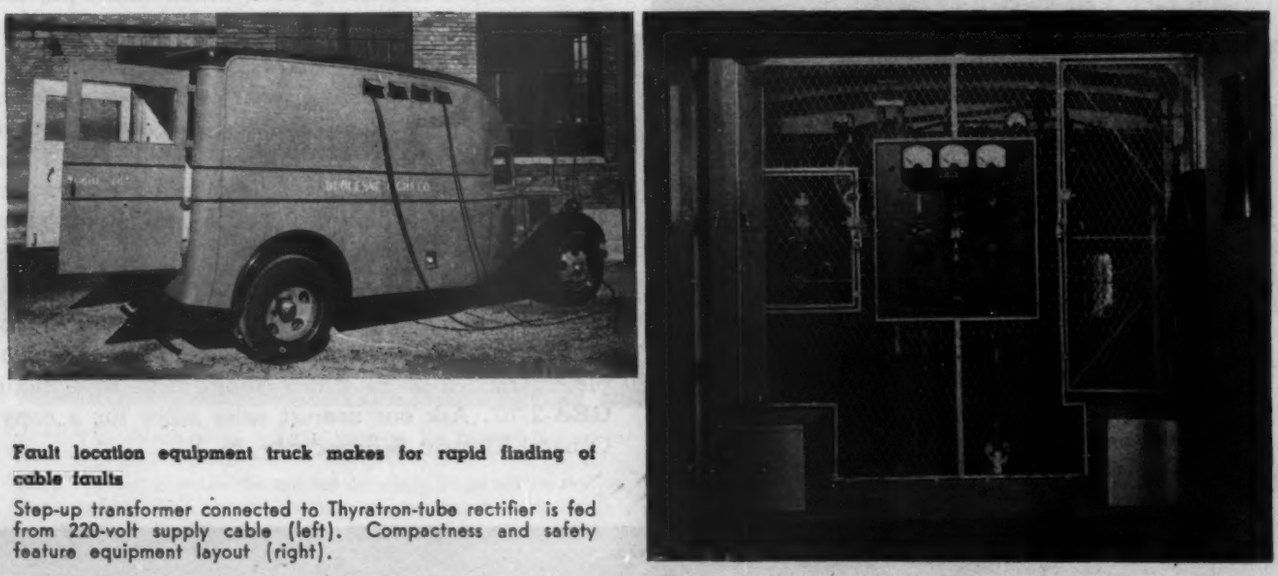
By M. W. GHEN
Superintendent Downtown Division, Duquesne Light Company

A compact fault-locating equipment truck capable of supplying 5 amp. at 10,000 volts or 10 amp. at 5,000 volts direct current has been in operation for three years and has been successfully used in the rapid location of cable faults, a large majority having been located within one hour after the equipment was placed in operation on the line.

Briefly, the equipment consists of a 220-volt supply cable feeding a step-up transformer connected to four Thyratron tubes for full wave rectification at 10,000 volts. The transformer is supplied through a 50 per cent buck-and-boost regulator for controlling the output voltage and maintaining current at the desired value. A current-limiting reactor is also used to limit total energy consumption in the event of sudden breakdown of a fault when the voltage applied has approached upper limits. Energy may be supplied constantly or interrupted for signal purposes by means of a motor-driven mercury switch which is in the control grid circuit of the Thyratron tubes.

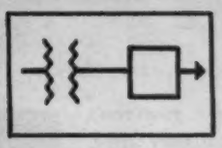
The method used is the familiar one of sending out an interrupted direct current and detecting its presence in the conductor by means of a pick-up coil and galvanometer. This current does not flow in the conductor beyond the fault. Final check is a sheath drop measurement on both sides of the fault. This measurement depends on the return current flowing back to the set through the lead sheath and other ground return paths. The section in which the fault is located will show sheath current flowing in opposite directions in the manholes at each end, an indication which it is impossible to observe in any other cable section on the line. Faults on lines several miles in length can be located by entering only seven manholes.

The equipment is mounted on a Ford 1½-ton chassis equipped with a special body. Every provision for compactness and safety was observed in planning the equipment layout. All means of access to the equipment are interlocked with the set supply and all equipment, including the truck frame, is grounded to a common ground bus. This bus is grounded in turn to the station ground through a spare conductor in the low-voltage supply cable and also by means of the braided metallic safety sheath covering of the high-voltage cable. The lengths of primary and secondary cables carried are 300 ft. and 200 ft. respectively. Provision is also made for plug-in telephone facilities which allow the set operator to talk directly to the men in the field.



Fault location equipment truck makes for rapid finding of cable faults

Step-up transformer connected to Thyratron-tube rectifier is fed from 220-volt supply cable (left). Compactness and safety feature equipment layout (right).



A single-circuit unit substation without disconnect switches, installed by Coast Counties Gas & Electric Co.

12% Saved in Installed Cost *by Using* a 1000-kva G-E Unit Substation

Coast Counties Gas & Electric Company Installs It Overnight

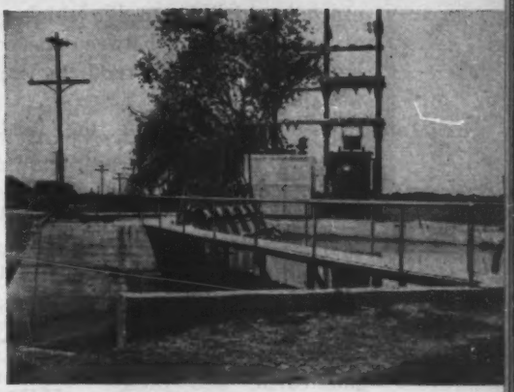
EVERY claim that General Electric has made since it pioneered the unit-substation idea, in 1931, was met by this interesting installation:

1. Costs less to install: Coast Counties figures a 12 per cent saving in actual cost, installed. Installation labor amounted to only 2 per cent of the cost of the equipment.

2. Saves time in installation: Installed overnight, without interrupting heavy work schedules of construction crews.

3. Saves on real estate: Over-all dimensions of the unit are 10 feet, 2 inches; by 7 feet, 6 inches; by 13 feet high.

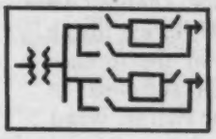
4. Attractive appearance: The company used photographs of the proposed equipment to convince land owners that the installation would not be an eyesore.



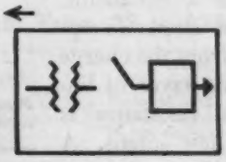
5. Saves on system investment: Load growth can be taken care of in small increments by low-cost unit substations which can later be moved complete to other locations.

The Coast Counties installation is a single-circuit unit without disconnect switches. Other installations pictured here show a single-circuit unit with disconnect switches, and a multiple-circuit unit with disconnect and by-pass switches.

For that next area to be served, try a G-E unit substation and experience the satisfaction that dozens of users are enjoying. General Electric Company, Schenectady, N. Y.



↑ Multiple-circuit unit substation installed on an Arizona irrigation project



← Single-circuit unit substation with disconnect switches, installed by a Southwestern utility

GENERAL ELECTRIC

310-37

INDUSTRIAL ENGINEERING

Induction Furnace Leakage Protection

In a coreless induction furnace a bath of molten steel is surrounded by a water-cooled inductor. The intervening space is occupied by a refractory lining, failure of which is not uncommon. Failure of the lining results in the molten steel coming into contact with the coil, with consequent damage to the copper conductors and possible explosion. When the induction furnace was first introduced a conductor section was utilized which insured a thick wall of copper existing between the cooling water and steel, reducing explosion hazards.

A method whereby the furnace would be turned off before an arc could form after lining failure is described in the August 25, 1939, issue of *The Engineer* (British), in which a patented auxiliary circuit is made to connect with a relay between the high-frequency circuit and earth, and then earth the charge. An electrode buried in the bottom of the furnace lining is sufficient to earth the charge. When hot, the lining material becomes a conductor. With the electrode separated from the charge by a thin layer of lining, the resistance is but a few ohms. A high-frequency system is connected to earth by a special circuit and operates by injecting a 50-cycle supply into the high-frequency system. The magnitude of the 50-cycle system depends upon the resistance between the high-frequency system and earth, and a relay is arranged to trip the main high-frequency contactor, thus isolating the high-frequency generator should the current rise above a certain value.

The relay circuit comprises a small single-phase transformer tapped on the primary side and supplying a relay through a resistance, *a*, *b*, *c*. Across the resistance *b*, *c* and the relay is connected the primary of a high-impedance, set-up coupling transformer with a bypass condenser connected across the secondary. One end of the transformer's secondary is connected to earth and the other to the high-frequency circuit via a high-frequency choke. The relay is fitted with two sets of contacts, one of which is connected in the tripping circuit of the generator contactor and the other in a lamp circuit to indicate when the relay has tripped.

The resistance *a-b* carries the relay and coupling transformer currents, and provided that the latter remain small, the relay remains energized. But as the transformer current increases the potential drop along resistance *a-b* increases until a point is reached at which the relay is de-energized. With the insulation resistance between earth and all parts of the high-frequency circuit infinitely high, no current other than the magnetizing current will flow in the coupling transformer, and by tuning the transformer with the by-pass condenser this current can be reduced to minimum.

If the 50-cycle supply to the relay circuit should fail the relay will trip, thus insuring that the furnace cannot be operated unless the relay circuit is in operation. The lining may become spongy, allowing metal to trickle slowly through toward the coil, but the relay will operate before the metal actually reaches the coil. Thus no arc is struck and no damage is done to the coil.

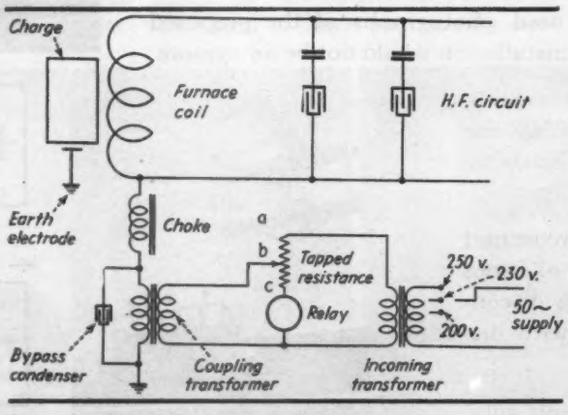
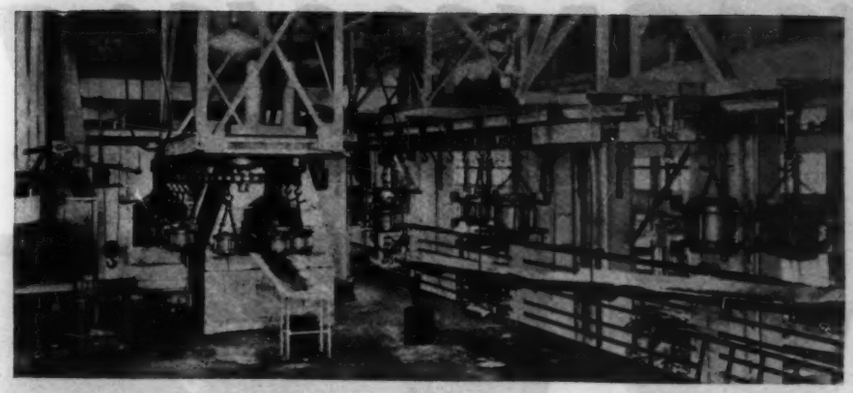


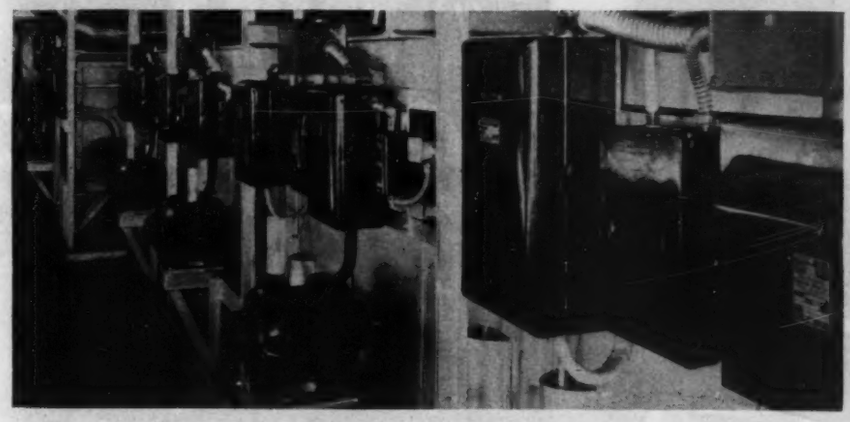
Diagram of earth leakage protection

New Oven Quadruples Heat Transfer Rate

When the General Electric Co. replaced a gravity conveyor type oven for baking induction motor stators at its River Works, Lynn, Mass., with a newly designed oven of the forced convection type the time of the baking cycle was cut more than 80 per cent; energy consumption per stator baked and treated with compound cut nearly 40 per cent, and the quality of the work improved. Both the old and new installations were electrically heated, but the latter's heat transfer rate was 18 B.t.u. per sq.ft. per hour per degree F., against 4 in the former case. There was also a reduction in total wall surface of



Stators are loaded from conveyor at right while wet from dipping and transferred by hoist to oven conveyor at left center



Battery of motors and controls for recirculation of air in sections of electric oven for baking stators

from 4,629 sq.ft. to 1,907 sq.ft. and in total oven weight from 50,000 to 25,000 lb.

The new installation includes one compounding oven and two varnish baking units, one of the latter normally being used at a time unless production demands both. The stators are dipped after being completed in the machine shop and are then routed by conveyor through one of the varnish ovens, the operating temperature being 160 to 180 deg. Make-up air, a small percentage of the volume moved, enters the oven sections through intakes at the ends and top, and only enough air to insure removal of fumes is exhausted through appropriate openings and discharged outdoors. Each baking oven has fifteen sections, each section being equipped with a 5-hp. induction motor driving a direct-coupled recirculating fan inside a perforated compartment in which are mounted the fin-type Calrod heating elements over which the air flows. These elements total 225 kw., and besides the 75 hp. in motors above mentioned, each oven is equipped with a 1-hp. conveyor type gear motor and two 3-hp. ventilating fan motors for withdrawing fumes. The original installation used ribbon type heating units having a total rating of 200 kw., a 3-hp. ventilating fan motor and 2-hp. conveyor motor being required.

Automatic temperature control was provided in the old and new layouts, but the distribution is so even in the new oven that the variation is but 5 deg., against 20 deg. formerly. The conveyor length was cut from 620 to 140 ft. and the conveyor speed raised from 9 in. to 11 in. per minute in the new layout. The weight of insulation was cut from 23,200 to 128 lb. Formerly twelve hours were required to heat the oven; today but 1.5 hours is needed. The over-all advantages of the new layout, even with its 75 hp. in fan drives, are most striking.

The compound oven, through which the stators are conveyed after the varnish is baked, operates at 150 deg. C. The work remains in the oven sixteen minutes. This oven has 15 hp. motors and 68 kw. in heating and the average energy consumption is 1.15 kw.-hr. per stator.

•

Cost of Installing Lighting Transformer

From the cost sheets of a power company serving an important industrial plant are taken the following data on the expense of installing a 50-kva., 13.8-kv. to 115/230-volt industrial lighting transformer in connection with factory modernization:

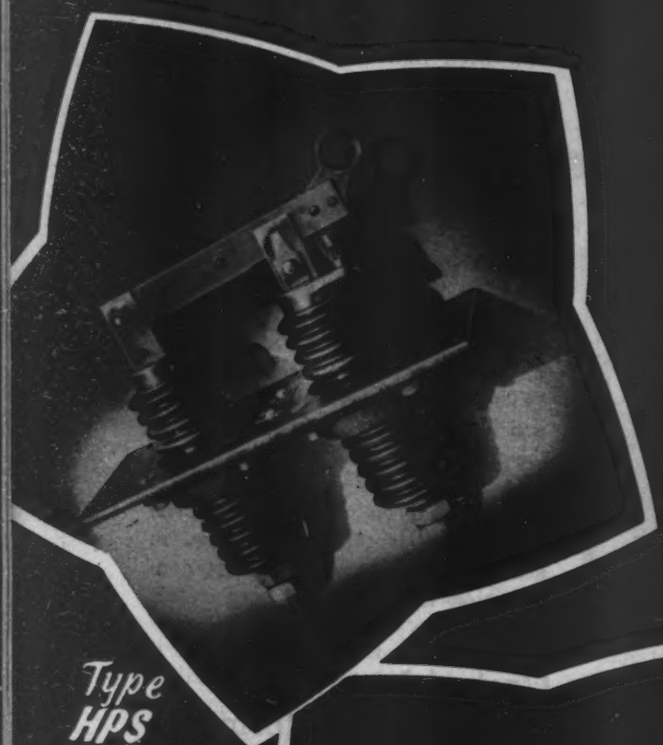
Transformer	$398.80
Labor	117.18
2 15-kv. fused switches	70.00
2 15-kv., 18-amp. fuses	21.32
23-lb. ¼-in. copper tubing	3.22
12-lb. 9/16-in. solid copper rods	1.80
2 Pin-type insulators	2.70
1 Screen, 54 x 55 in., No. 9 wire and ⅜ x ¾-in. channel frame	6.50
Miscellaneous	36.97
Total	$658.49
or per kva	$ 13.17

Comparison of Old and New Stator Baking Ovens — Stators Range in Weight From 35 to 175 Lb.

	Old	New (12% greater capacity)
Use	Baking a.c. stators	Baking a.c. stators
Heating method	Electricity	Electricity
Dimensions	90 ft. 6 in. x 19 ft. 6 in. x 5 ft.	58 ft. 8 in. x 10 ft. x 5 ft. 4 in.
Wall surface	4,629 sq.ft.	1,907 sq.ft.
Conveyor length	620 ft.	140 ft.
Conveyor speed	9 in. per minute	11 in. per minute
Operating temperature	135 deg. C.	160–180 deg. C.
Insulation	Rockwool	Aluminum foil
Weight of insulation	23,200 lb.	128 lb.
Kilowatt-hrs. to heat insulation	204	1.13
Time to heat oven	12 hours	1.5 hour
Weight of oven	50,000 lb.	25,000 lb.
Heat transfer rate in B.t.u./sq.ft. hr./deg. F.	4	18
Kilowatt-hr. per stator		Reduced 40%
Heating units	Form G heaters	Finned Calrod
Kilowatt rating	200	75 hp. and 225 kw.
Temperature variation	20 deg. F.	5 deg. F.
Air velocities	Natural convection	1,200 ft. per min. 1st 9 sec. 900 ft. per min. last 12 sec.
Thermostats		G.E. Midget
Interlocks		Heaters and conveyor; motors cannot operate unless ventilating motors are running
Stops and starts		Push button, pilot lights in do

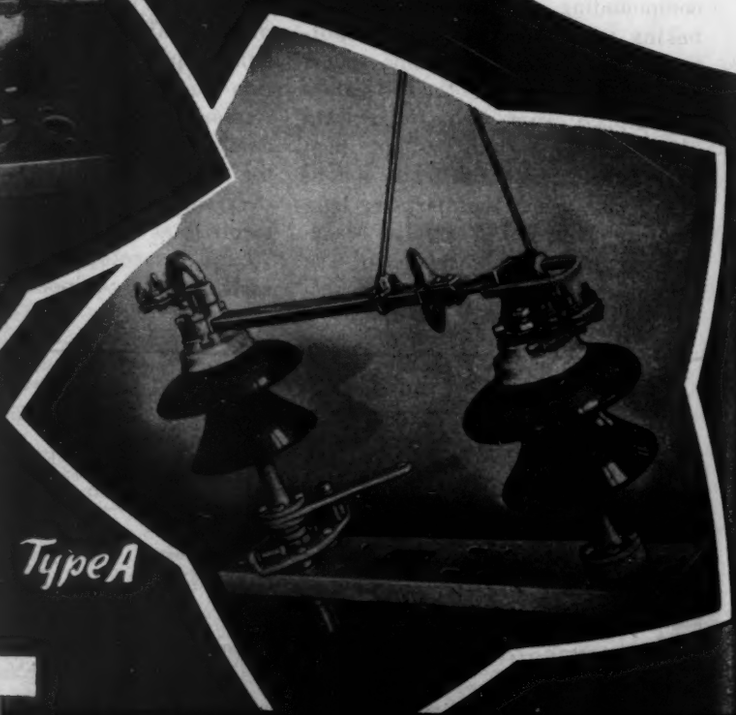
Announcing-

the big
R&IE
1940 REVUE
an all-star cast featuring
HI-PRESSURE CONTACTS



Type HPS indoor

Type HPS outdoor



Type A

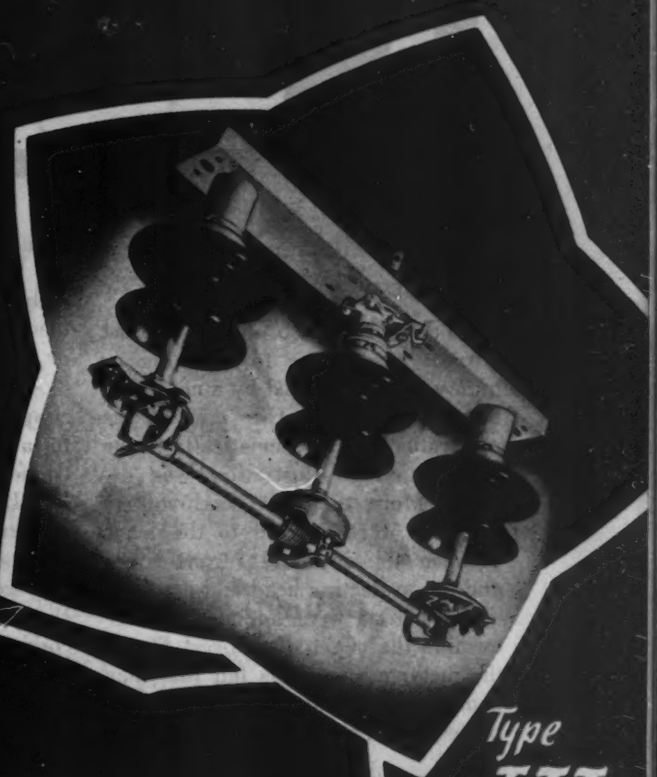
Let R&IE worry about y

Hi-Pressure Contacts characterize all R & I E switching equipment and are distinctive in that they develop sufficient pressure to thoroughly clean all surfaces making contact.

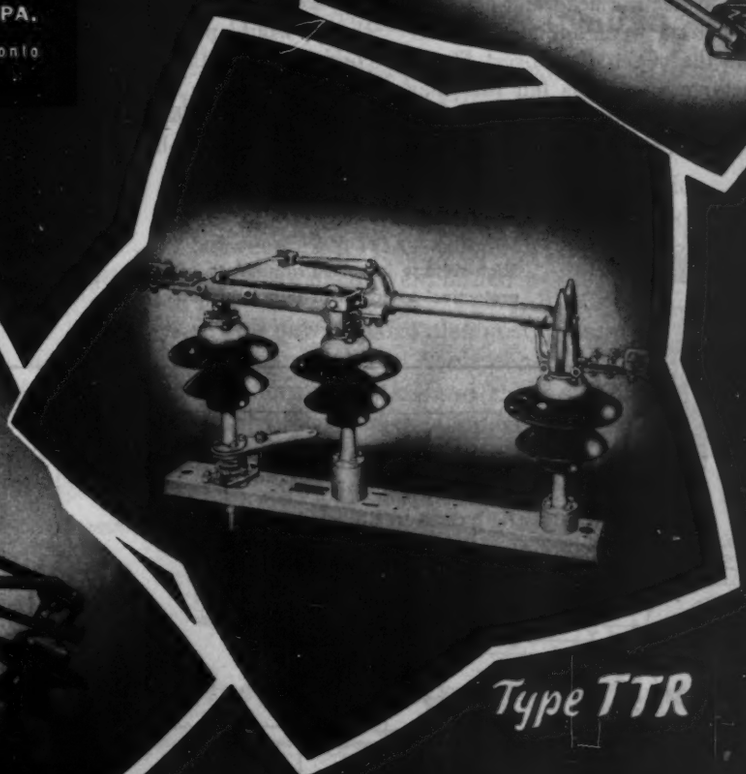
Hi-Pressure Contacts operate under pressure to wipe all contact surfaces clean of dirt, oxide, ice and soot, providing an intimate metal-to-metal contact with each operation of the switch.

Hi-Pressure Contacts, originally an R & I E development, have become the standard of the industry.

RAILWAY AND INDUSTRIAL
ENGINEERING CO. . . . GREENSBURG, PA.
In Canada: Eastern Power Devices, Ltd., Toronto



Type TTT



Type TTR

Type TTL

your SWITCHING PROBLEM

NEW ENGINEERING IDEAS

High-Voltage Testing of Meter Protector

To determine the protection against current surges due to lightning or high voltages afforded by a new watt-hour meter protective device, the apparatus shown schematically in the accompanying illustration was devised. More than 200 high-voltage impulses were applied to the leads between the insulating transformer and the protecting head and meter.

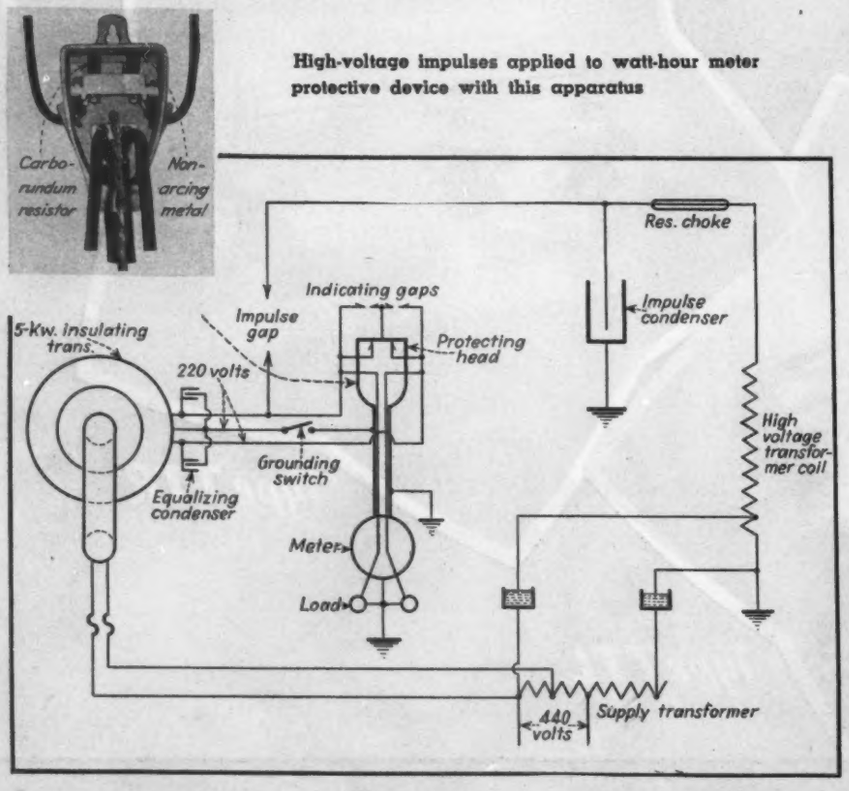
While tests were not made to determine the effect of a direct hit on the meter circuit, it is felt that they demonstrated that the head should protect against most lightning transients caused by lightning strokes in the vicinity of the meter and that rather heavy discharges can be handled before blowing the transformer or service fuses.

A 5-kw. insulating transformer supplied 220 volts to the head and to a single-phase, three-wire meter connected for two-wire, 115-volt service. Low capacitance of this transformer, together with the high breakdown strength between its primary and secondary, provided that the discharge would pass from the impulse condenser over the cicuit to the meter with a minimum of absorption. Impulse voltage and normal-frequency voltage were in phase; polarity of supply circuit was reversed by changing leads to supply transformer.

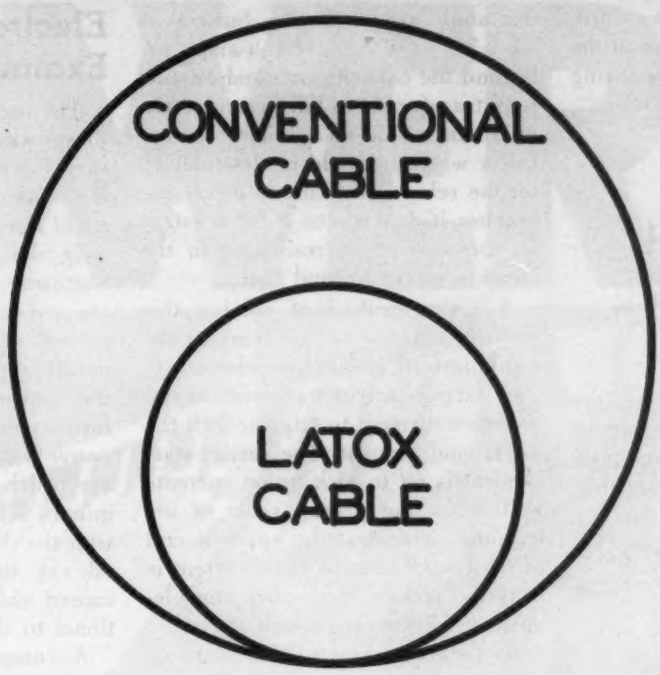
After the circuit had been energized at 220 volts, 60 cycles, the voltage on the impulse condenser was charged to various discharge voltages starting at 63 kv. crest and increasing in five steps to a maximum of 92 kv. crest. To test the ability of the head not only to limit overvoltage but also to prevent the flow of normal-frequency current following a discharge, the meter circuit was subjected to single and to groups of impulses. In all cases the head limited the normal-frequency current so that there was no noticeable effect on the lights immediately below the meter (meter load).

Tests were made both with and without the equalizing condenser between the two leads running to the meter. For part of the tests, the resistance choke between the high-voltage transformer and the impulse condenser was shorted out, allowing high-voltage, normal-frequency current to follow the impulse. This current burned out the lamps and also blew the fuse on the primary side of the insulating transformer. The fuse was replaced and several tests were run without removing the burned-out lamps, subjecting the meter to impulses without load. After the burned-out lamps had been replaced with new ones the meter disk appeared to rotate on a normal basis; a later check showed that the meter had not been affected.

Using a different arrangement, a surge test was also made on the meter-protecting head. Charging voltage was 120, surge amperage, 17,800; revolution of standard meter before tests, 10.662–0.62; after, 10.56–0.55, or plus 9.52 per cent



High-voltage impulses applied to watt-hour meter protective device with this apparatus



Would you care to have a copy of the October 1939 revision of our booklet "Simplex-LATOX Cables?" In brief, concise form it describes the physical and electrical properties of Simplex-LATOX rubber insulation and discusses the benefits to be obtained through the use of this high grade, thin insulation on control cables, fire and police signal cables, telephone cables and shipboard communication cables.

A section of the booklet is devoted to supervisory control cables, insulation thicknesses are listed for various voltages and a chart shows the relative sizes of LATOX insulated cables and cables made under ordinary specifications.

Fire alarm and police signal cables are discussed at some length. Brief specifications, including rubber and lead thicknesses, show how the cables are made and specified tests to which they are subjected before shipment. Safety and dependability are emphasized.

Simplex-LATOX telephone cables because of their wide use are also fully covered. Electrical characteristics and attenuation losses are discussed in some detail. The differences between LATOX telephone cables and other types are clearly explained.

The new booklet also describes Simplex-LATOX shipboard cables. Their construction is covered in considerable detail and their small size and light weight is stressed as a desirable feature for cables intended for installation on ships. Color coding for conductors and the different types of protective coverings are also fully covered.

Ask for the booklet entitled "Simplex-LATOX Lead Covered Cables."

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge, Mass.

Simplex–LATOX

Thin insulation made directly from rubber latex

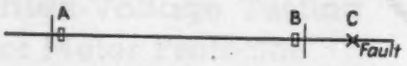
change in revolution. Meter protective device is a development of the M. & W. Electric Manufacturing Company, East Palestine, Ohio.

•

Carrier-Current Relaying Improved

By S. L. GOLDSBOROUGH
Relay Engineer, Westinghouse Electric & Manufacturing Company, Newark, N. J.

By using two overcurrent elements of a balanced-beam, spring-restrained construction instead of one combined breaker-tripping and carrier-starting element of the plunger type a carrier-current ground relay is provided that has a burden of 0.1 volt-amp. instead of 8-volt-amp. and that secures positive protection for faults anywhere on the line section and of almost any magnitude.



Two over-current elements improve carrier-current ground relaying
Using ground relays with one over-current element and one directional element at "A" and "B", with a fault at "C," the relay at "B" should send a carrier signal to the relay at "A" (because the "B" directional element is open) to prevent its tripping the breaker. If fault is near minimum operating value, however, relay "A" might operate, but not "B," in which case no signal would go from "B" to block tripping at "A." Current transformer errors and relay variations prevent setting both relays to pick up at same current. Trick is to use two overcurrent elements instead of one.

The ground relays originally employed had one overcurrent element and one directional element. The overcurrent element was arranged to initiate carrier transmission when a fault occurred and also, in conjunction with the directional element, to trip the circuit breaker if a carrier signal was not present. This arrangement meant that it was not possible to block the tripping elements when the ground fault current was near the minimum tripping value of the overcurrent element.

To set the overcurrent elements to operate on ground currents considerably below the minimum value to be expected for a fault at any place on the system introduces another difficulty. The relay originally used had a burden of about 8 volt-amp. at minimum pickup. At 5 amp., therefore, a relay with a pickup of, say, 0.5 amp. would have a burden of $(5/0.5)^2 \times 8 = 800$ volt-amp., far beyond the capacity of standard current transformers. Furthermore, the minimum value of ground current below which it would be desirable to set the relay is difficult to determine because it depends to a large extent on the amount of resistance in the location of the ground fault.

A better method of solving this difficulty is to use two overcurrent elements instead of one, one element to start carrier-current transmission and the other element to trip through the directional element. The carrier-start element is set to pick up on currents well below the pickup value of the tripping element at the opposite end of the line. When the fault current is near the pickup of the tripping element, it will be far enough above the carrier-start pickup to take care of the current transformers and relay variations. If the fault current is near the pickup of the carrier-start element it will be well below the tripping element pickup.

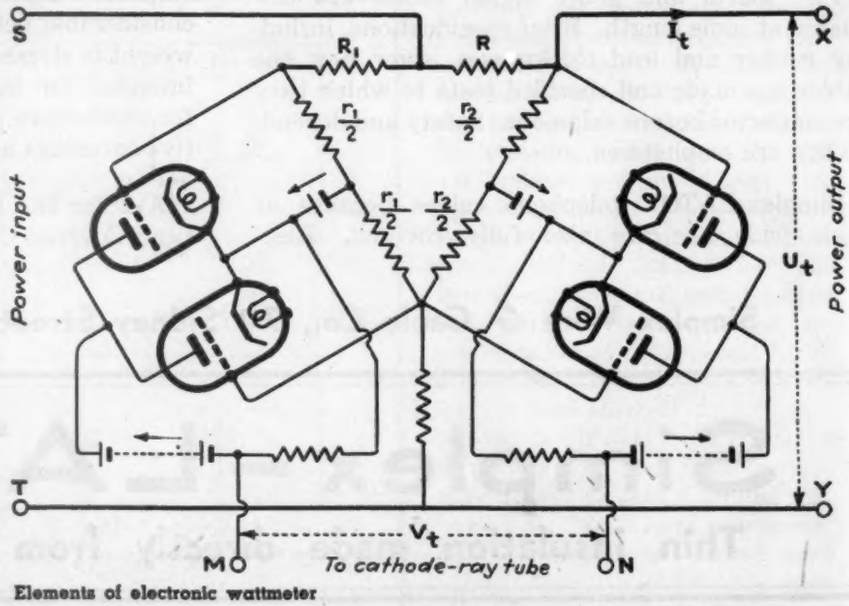
The relays built to accomplish these results are known as types HRK and HRP, the former being used where there is a power transformer bank at the station with a current transformer in the grounded neutral and the latter being used where the polarizing energy must be obtained from a zero-sequence voltage. The balanced-beam construction of the two overcurrent elements is a modification of the high-speed impedance element wherein the voltage restraint is replaced by a constant spring restraint.

Electronic Wattmeter Examines Power Wave

The oscillographic investigation of power wave forms is becoming necessary for electrical research and testing work. In a recent article in *Electrical Review* (British), I. E. Rosenzweig describes a special electronic wattmeter, essential parts of which are grid-controlled vacuum tubes, connected with a normal cathode-ray oscillograph, which may be used for this purpose. The wattmeter transforms inertialessly the instantaneous power value into proportional voltage which appears on its output terminals. When the latter are connected with the deflection plates of the cathode-ray tube, beam deflections are caused which are at any time proportional to the instantaneous power.

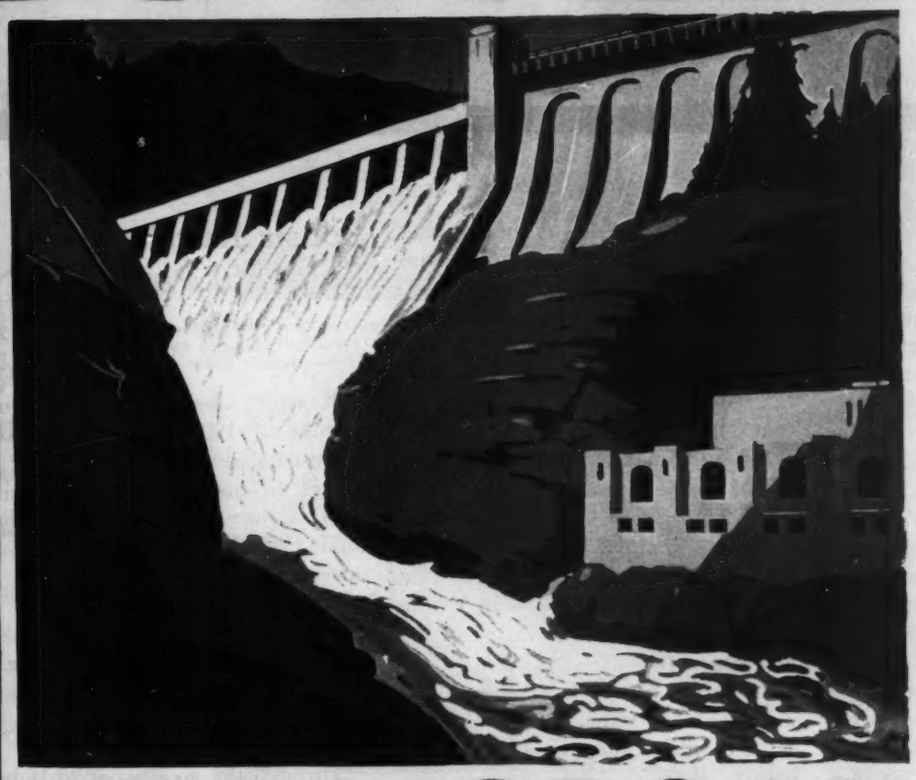
As compared with existing arrangements for the delineation of power wave forms the electronic wattmeter has the advantages of extremely small inertia so that circuits of low frequency as well as those of the highest frequency can be tested and, moreover, it can be used for recording power transients by traveling waves.

The electronic wattmeter may be used to investigate circuits with very small power values (of a few milliwatts) and is designed as an independent apparatus which can be used in connection with any normal type of cathode-ray oscillograph, while the apparatus can be easily adapted for every required value of the current intensity and the circuit voltage that are appropriate to the particular work in hand.



Elements of electronic wattmeter

POWER



BY S-MORGAN SMITH Co.

has been synonymous with the generation of ELECTRIC POWER from Water, since we installed our first turbine driving an electric generator in 1895.

Write for Bulletins - S. Morgan Smith Co. York, Pa.

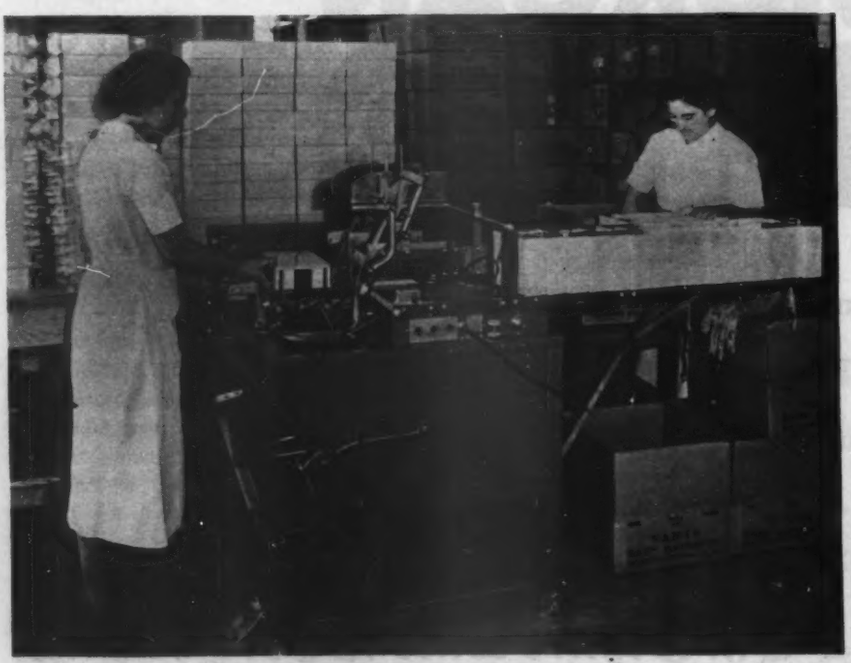
MORE THAN 63 YEARS OF HYDRAULIC EXPERIENCE

LOAD BUILDING

Electric Sealing Uses 943 Watts

Before this Miller wrapping and sealing machine went into service at the Earnshaw Knitting Company's plant in Newton, Mass., packages of "Vanta" baby bathkits had to be wrapped and sealed by hand. Electric heat plays a vital part in the operation of the new equipment, which is adapted to the rapid handling of the standard kit and also to the company's smaller gift type package. The machine is driven by a ¼-hp., 110-volt motor. It is equipped with two heating units at the left end which are used in tack-sealing the smaller packages; two electrically heated plates at the right center and one other hot plate for the bottom of the package, and with thermostatic control. Seventeen cellophane-covered "Vanta" kits per minute are normally handled, and under former conditions four more girls were required to do the work than are now needed. It is estimated that the machine will pay for itself in six months maximum.

This machine will wrap packages from 2.5 to 15 in. long, 1 in. to 8 in. wide and ½ in. to 3.5 in. high. Adjustments can be made to change from one size to another in about three minutes, without tools. The rating of the heating units is 24 watts each for the spot sealers at the front end of the machine, 200 watts for each of the two side plates and 375 watts for the bottom plate.



Seventeen bathkits per minute pass through this sealing machine with 943 watts of heating, ¼-hp. motor

Boosts Roaster Sales 151 Per Cent

By J. M. STEDMAN
Manager Residential Sales
Pennsylvania Power & Light Co., Allentown

Roaster sales for the first nine months of 1939, by company sales representatives and co-operating retailers, to customers of the Pennsylvania Power & Light Company have totaled 2,476 units, of which co-operating retailers have sold 52 per cent. These sales represent an increase of 151 per cent over the same period of 1938 and an increase of 80 per cent over the total sales of roasters to customers during the entire year of 1938.

Through the good work of today's domestic science organizations, women's publications, etc., the average housewives understand why oven cooked and broiled foods and steamed vegetables are more delicious and healthful, and they want equipment at reasonable cost which will make such results possible, though in large numbers they do not yet see their way clear to purchase modern ranges. Sales presentation and demonstration of the ability of the electric roaster to answer that need is responsible for the success of roaster selling in this area.

The roaster has been included as an important factor in each of our co-operative major appliance sales activities because the same sound creative sales methods used to interest customers in new and better cooking equipment are required to sell roasters in volume. In addition, the roaster was featured in a June "Appliance of the Month" Activity. During all such activities demonstration of the superior results and

Filling Empty Sockets!

The right size bulb story in terms everyone can understand

This kind of copy helps fill empty sockets

Eyesight is precious — light is cheap

Should married people fight?

"YOU'D FIGHT!" says Elmore Haring. "If you lived with a chronic bulb-swapper. I go to read, and my wife has hooked the 100 watt bulb from my reading lamp and put it in the kitchen! I start to shave, and by golly she's even swapped bulbs in the bathroom. So I carve myself to ribbons by the light of a measly 25 watt bulb! It's an outrage, me living in a wilderness of empty sockets and misfit bulbs!"

"THAT'S SILLY!" exclaim the Wheatleys. "What's the use of fighting about light, when even the new brighter 100 watt G-E MAZDA lamps cost only 15¢? We keep a half dozen 'extras' always on hand, and never worry about wrong sizes, empty sockets, or eyestrain!"

WATT to do about it...

IF YOU want to keep peace in the family, and put an end to eyestrain and headaches caused by bad light, check your lamps and fixtures now with the chart at the right. And if you find 40 or 60 watt bulbs sneaking in where 100's or 150's should be, run, don't walk, to the nearest store that sells G-E MAZDA lamps. The new brighter 100 watt size costs only 15¢, and a penny or two will light one all evening! *They stay brighter longer!*

Check your bulbs now with these right sizes

I. E. S. BETTER SIGHT TABLE, END TABLE, MIRROR FLOOR LAMPS, LAUNDRY, GARAGE	100 WATT	15¢
LARGER I. E. S. TABLE AND FLOOR LAMPS, KITCHEN, HOME WORKSHOP AND GAME ROOM	150 WATT	20¢
2-SOCKET READING LAMPS AND PIN-TO-WALL LAMPS WITHOUT DIFFUSING BOWL	75 WATT	15¢
BATHROOM — WALL BRACKETS BESIDE MIRROR	40 OR 60 WATT	15¢
I. E. S. THREE-LIGHT FLOOR LAMPS AND FIXTURES DESIGNED FOR 3-LITE BULBS	100-200-300 WATT	60¢

G-E MAZDA LAMPS
GENERAL ELECTRIC

THIS ad in a recent COLLIER'S was read by 2½ times more people than the average ad in that issue. It is typical of the millions of messages General Electric is running this spring to sell Better Light - Better Sight.

G-E MAZDA LAMPS
GENERAL ELECTRIC

the almost unbelievable cooking capacity of today's roaster have been included in every demonstration conducted in the interest of company and co-operating retailers' cooking appliance sales.

Trade-in Plan

Customers are encouraged to prove the benefits and advantages of modern electric cooking with an inexpensive roaster and arrangements are offered by the company and most co-operating retailers in the area to trade in the roaster at 75 per cent of the purchase price toward the purchase of a complete modern electric cooking service as rendered by the electric range, using the remainder of the purchase price to recondition the roaster so that it may be sold as a new appliance. Hundreds of actual electric range sales are reported to roaster users where other sales presentations and demonstrations have been unavailing. It is important, though, that the roaster has sold itself, as a modern cooking appliance, so well that in less than 25 per cent of such cases has the roaster been traded in on a new electric range.

Each roaster sale reported by company sales representative or co-operating retailer is demonstrated by a company home service representative immediately following delivery. This follow-up results in the roaster being placed in proper daily use and in very worth-while energy sale.

Because of the satisfaction of present roaster users, and the enthusiasm for selling them on the part of company sales representatives and co-operating retailers, some dealers have started weekly payment roaster clubs, dairies have conducted very successful roaster premium promotions and the appliance is rapidly gaining acceptance in the area.

Utah Power Develops Low Cost Rural Cooker

By K. W. BROWNING
Assistant Manager, Residential Sales,
Utah Power & Light Company

Development of an extremely low-cost device for cooking potato culls which are used for hog feed has saved money for many rural customers served by Utah Power & Light Company and has proved to be a desirable way of introducing electric usage to the farm. Potato culls must be cooked to make an effective hog feed, but naturally the process must be inexpensive.

The Utah cooker is made by taking a 40-gal. range boiler, cutting out the bottom and using this open end as the top. A ¾-in. rim is left to a accommodate a rubber gasket, and an old plow disk is used as a lid. A couple of fittings are welded to the tank at the top to provide for a hinged bar which is used to clamp on the lid. The lid is equipped with a safety valve.

Strip heaters are wrapped around the tank near the bottom, providing about 3 kw. capacity. The whole is covered with insulation and mounted on trunnions, the latter so it can be upended to dump a batch.

The tank is filled with potatoes and just enough water is added to cover the area where the heat elements are clamped on (3 to 5 gal.). Pressure rises to 7 or 8 lb. per sq.in. during cooking and the upper potatoes are cooked by steam.

It takes about four hours to cook a 40-gal. batch and energy consumption amounts to 11 or 12 kw.-hr.

Customers like the equipment because it is trouble-free and cheaper and safer than wood or coal. In freezing weather the fact that the cooker can be safely operated indoors makes for savings by forestalling loss of feed through freezing.

Cooker made from a 40-gal. range boiler, mounted on trunnions so it can easily be emptied. Elements, rated at 3 kw., are wrapped around the boiler near the bottom

Demonstration Order Spurs Lighting Sales

By L. E. TAYLER
In Charge of Lighting Sales
Detroit Edison Company, Detroit, Mich.

Like many other utility lighting divisions operating under a strict non-merchandising policy that dictates absolute impartiality in recommending lighting equipment, we have, until recently, experienced difficulty in carrying recommendations for improved lighting to completion in the mass market of small commercial customers. The inability of the lighting salesmen to back up specific recommendations as to improvements in lighting with corresponding equipment recommendations created a situation difficult to sell against. It was highly desirable that a complete service be rendered the small merchant, who, unlike the larger "downtown" stores, had little conception of the part illumination plays in modern merchandising. These customers must be told what to buy, where to buy it and how much it will cost.

The weakness and difficulty of this position, particularly as regards the mass market of small stores, has been recognized for some time. In the past year and a half the problem has been given careful thought in an effort to find some way of closing the sale on the customer's premises without usurping policy *too* much. As a consequence, a "Demonstration Order" plan was developed, tried and found successful in selling light conditioning to small stores at low cost through use of adapter-type lighting equipment.

Essentially the "Demonstration Order" plan involves a request, or pseudo-order, signed by the customer, calling upon the dealer to deliver adapter units at his store. It verifies the unit price which a dealer-utility agreement permits the lighting salesman to quote to the customer, but does not bind the customer to purchase the equipment. Purchase of the units is consummated between the dealer and the customer when the latter signs a sales order presented by the dealer's agent upon delivery of the equipment or upon its satisfactory installation by the dealer.

Signing of the "Demonstration Order" terminates a chain of events initiated when the utility lighting

[*Continued on page 142*]

A Frank Statement

About Kelvinator's Radically New 1940 Program That Makes Possible Sensationally Low Prices . . . And Greater Profits for Dealers

BY FRANK R. PIERCE, General Sales Manager
Kelvinator Division, Nash-Kelvinator Corporation

I KNOW you will be surprised when you see the prices printed on these pages.

A few days from now they will be published across the country. But before that happens, I want to explain them to all retailers of mechanical refrigerators—because there is not one of you who won't be affected, no matter where you may be located.

Those who built our industry—the dealers—have been waiting for several years for some manufacturer to have the courage to give them a program which meets today's conditions in the refrigeration business.

In a word: Kelvinator's prices and products for 1940 are part of a single broad-gauge program . . . representing radical changes in fundamental policy . . . one that is sound as a dollar from start to finish . . . a program that has these objectives:

1 To protect and stabilize the profits of Kelvinator dealers.

2 To meet the competitive price situation in the electric refrigeration business today.

3 To step up to the replacement business by providing specific products with margins adequate for the dealer to sell this business at a profit.

4 To limit the number of dealers in each community so that sufficient volume is possible, at recommended prices, for dealers to make a profit.

5 To reduce the dealers' investment by reducing the number of models.

In a nutshell, we expect this program to result in increased volume and profits for our dealers and ourselves.

This program is—very candidly—one of the most far-reaching plans ever adopted in an industry. But before I go any farther, I want to make one thing clear. Not only has it been accomplished without a penny's reduction in dealers' retail profits—but without a single compromise in the quality of our product. As a matter of fact, dealers' profits are higher; and the products the best we've ever built.

I think that every dealer who has ever wished for lower prices is entitled to know how Kelvinator was able to put this program into effect:

Briefly, here's what we have done:

1 We've concentrated 96% of our production on the big 6 cubic-foot size models, and larger, that people really need. That lets us lower the price some.

2 In anticipation of greatly increased sales, we've *doubled* our production schedules and passed the manufacturing savings on.

3 We've cut our cost of selling—so we can lower our price still further.

In addition, we have cut our own manufacturing profit per unit in anticipation of greater sales.

And . . . to further simplify dealers' price problems . . . in all states east of the Rockies, we are paying the freight, on carload shipments to destination, and also absorbing the L.C.L. delivery cost from zone or distributor warehouses in excess of 50 cents CWT. This is to permit advertising nationally of suggested retail prices for delivery in the consumers' kitchens.

Now please take a look at the pictures and specifications of the Kelvinators we're selling at these prices.

LOOK AT THE SIZE
LOOK AT THE NAME
LOOK AT THE PRICE
BIG 6¼ CUBIC FOOT Large "Family-Size"
NEW 1940 KELVINATOR from the oldest maker of electric refrigerators
$119.95* Delivered in the Kitchen with 5 Year Protection Plan
KELVINATOR SS-6. Compare with $150 refrigerators. 6¼ cu. ft. Bright Permalux exterior. Porcelain-on-steel interior. Stainless-steel, high-speed Freezer with white Permalux-finished door. 2 extra-fast Freezing Shelves, 9 lbs. — 84 ice cubes. Kelvin Cold Control. Tempered glass, Cold Storage Tray under freezer. Interior Light. Powered by famous cost-cutting Polarsphere sealed unit. Kelvinator's price only $119.95*

THE BEST KELVINATORS EVER BUILT
NO PRIOR-YEAR MODELS

You will note first of all that price reductions apply to the whole Kelvinator line . . . from the base-price model right up to the de luxe models. Reductions range from $30 to $60, as compared with last year's prices.

Next thing is: every Kelvinator here is a new *1940* product. There isn't an obsolete last-year model in the line.

Our idea of meeting low-price competition is *not* giving our dealers a year-old model, with probably shorter discounts. Instead, we're starting our dealers with a clean, *new* stock.

And these Kelvinators are remarkable in another respect. You've heard of "bargain" refrigerators before. This isn't it. You've probably had to contend with stripped-down, second-line products. You won't find them here.

Let me repeat: *these are the finest Kelvinators we know how to build—1940 models every one.* Starting with the fine, big, six-cubic-foot models, and working right on up through the big de luxe jobs, they surpass any Kelvinators ever built before.

I can't stress this too strongly.

Take our Model SS-6 for 1940, selling at $119.95.* If you'll examine it carefully, point for point, I know you'll agree you've never seen a current model made by a nationally-known manufacturer within thirty or forty dollars of its price!

Try to match its specifications and you'll see what I mean. Every Kelvinator is powered by the big Polarsphere sealed unit. We don't use a cheaper, weaker unit in our low-priced models. I think you know about the reliability of this unit. Of *all* the 1939 Polarspheres in use all over the world less than ½% have been replaced for mechanical reasons. I believe that's an industry record.

Other basic features are of the same high quality. Cabinet is welded-steel and finished in Permalux outside . . . all Porcelain-on-steel lining within. Insulation is the best.

Yes—it's a big, solid, fine-looking refrigerator. And any dealer will say—it has the features that *sell.*

But it's only the beginning of Kelvinator's great 1940 line. Every model in the line has "step-ups" in features that make "selling up" natural, logical and easy.

EVERY FEATURE OTHERS OFFER PLUS OUR OWN EXCLUSIVES

And when you handle that beautiful de luxe job . . . Model HD-6 . . . for only $209.95*—you have a refrigerator nobody's competing with.

With the new "Moist-Master" humidity system and all those other features you can see on the next page—it's the last word in fine refrigeration.

I want you to check this when you look at the pictures. And note that the price is what you used to sell "standard" models for.

Just count them. Five big "sixes". Prices from $119.95* to $209.95.* Compact three and four-footers, too (but it's just as easy, now, to sell a "6") and 3 eight-cubic-foot models.

Can you imagine what Kelvinator dealers will do with products and prices like these?

I'll tell you. They'll stop worrying about competition in any shape or form. They'll sell Kelvinators at a profit and lots of 'em. I don't believe they'll find it necessary to cut their prices to meet competition.

TWO VAST MARKETS ARE NOW WIDE OPEN TO KELVINATOR DEALERS

But . . . far beyond "meeting competition" . . . Kelvinator dealers will also cut straight into two vastly broadened markets.

One is the replacement market. You know scores of families right in your own neighborhood who are still getting along on worn-out, noisy, wasteful or undersized mechanical refrigerators.

As a matter of fact, there are at least *four million* families like that in the country.

When you go into that market with the 1940 Kelvinators especially designed and priced for that market . . . when you show them the bigger, finer, refrigerator with every modern convenience . . . when you prove it costs many dollars a year less to run—*that replacement business is yours.* And you can afford to trade at a profit because the prices and margins are there to help you trade.

And then there's that vast low-income market adequately provided for with models selling this year from $30 to $60 less than similar models in 1939. Only this year they are better looking and have more salable features.

You'll be able to sell a Kelvinator—a big, genuine 6¼-cubic-foot model . . . with Kelvinator quality through and through . . . for little more than the price of a good icebox. Further, for those who want additional equipment, convenience and de luxe features, Kelvinator has four more "Sixes" at prices that will fit their pocketbooks.

HEAVY ADVERTISING CAMPAIGN

I think you'll agree . . . this is a great product story. Actually, it is one that others have wanted to offer for years. And now Kelvinator does it.

But we're not just letting our 1940 product "sell itself". We're going to spread the news big—and spread it *now.*

In a few days, newspaper ads in large, dominating space will carry Kelvinator's story to local markets clear across the country.

Close on their heels, full-page color ads will break in national magazines.

You'll see "Look at the Size" . . . "Look at the Name" . . . "Look at the Price"—*everywhere.*

POWERFUL PROMOTION BACKING

I'll venture to say that our coming Spring Showing Activity will bring you the greatest rush of business you've had in years.

We'll be backing you with a great new Direct Selling Program and complete sales training helps from the Kelvinator National Salesmen's Institute.

Kelvinator's own finance company . . . ReDisCo . . . has even worked out a brand new "5-Sixes Plan" to make it easier for you to buy—so you can start selling quicker.

Frankly, I think this is the most far-reaching program any manufacturer will offer this year. It's not only a matter of products, prices, margins, prepaid freight, new advertising, and new sales methods. In fact, it's a *whole new way of doing business and making money.*

HOW TO GET FULL FACTS

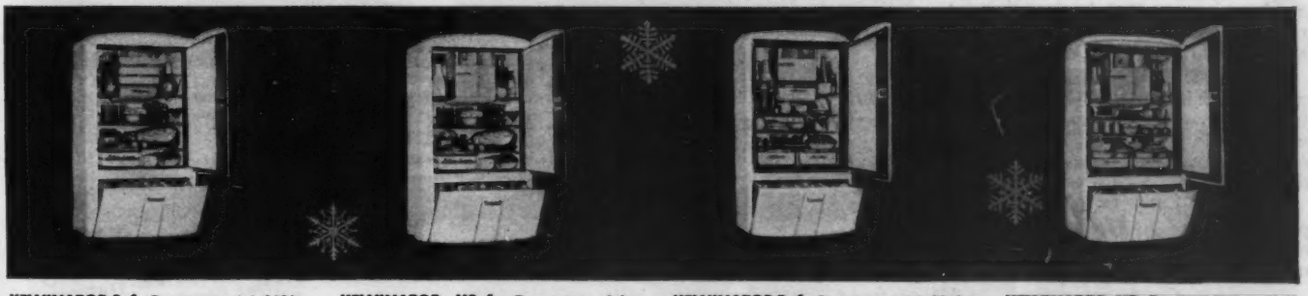
If you are not a Kelvinator dealer, the only way to realize what this revolutionary program means is to get in touch with us through your nearest distributor or factory branch.

Or, if you like, communicate with me direct.

Frank R. Pierce

General Sales Manager
KELVINATOR DIVISION
Nash-Kelvinator Corp., Detroit, Mich.

**Prices suggested are for delivery in the Kitchen with 5 Year Protection Plan. State and local taxes are extra. Prices are slightly higher west of the Rockies.*



KELVINATOR S-6. Compare with $180 refrigerators. 6¼ cu. ft. completely equipped model. Gleaming Permalux exterior with Porcelain-on-steel interior. Sliding glass covered Vegetable Crisper. Deep, sliding, moonstone glass Cold Storage Tray under Freezer. Vegetable Bin. Removable half-shelf next to crisper. Stainless-steel freezer with door, 2 extra-fast Freezing Shelves, 8 lbs.—64 ice cubes, new type Ice Trays, Kelvin Cold Control. Powered by Polarsphere sealed unit. Interior Light. Kelvinator's price only $139.95*

KELVINATOR HS-6. Compare with $230 refrigerators. A new 6 cu. ft. Kelvinator with the "Moist-Master" System that maintains higher humidities, decreasing the loss of moisture from foods. Permalux exterior and Porcelain-on-steel interior. Meat Compartment built in the freezer unit behind freezer door. Sliding, glass covered Vegetable Crisper. Vegetable Bin. 2 extra-fast Freezing Shelves, 8 lbs.—64 ice cubes, new type Ice Trays. New, flat, disc-type Kelvin Cold Control. Powered by Polarsphere sealed unit. Interior Light. Kelvinator's price only $169.95*

KELVINATOR R-6. Compare with $210 refrigerators. 6.5 cu. ft. Twin Sliding Crispers with glass tops. Sliding, Porcelain Cold Chest. Vegetable Bin. Sliding adjustable Shelves. Twin dome Lights. Stainless-steel Freezer with door, 2 extra-fast Freezing Shelves, 8 lbs.—72 ice cubes, built-in Tray Lifter and built-in Speedy-Cube Release. Double-size Ice Tray for frozen desserts. Kelvin Cold Control with automatic return from defrosting. Powered by Polarsphere sealed unit. Kelvinator's price only $179.95*

KELVINATOR HD-6. Compare with any refrigerators from $230 to $300. A new, 6.1 cu. ft. de luxe Kelvinator with "Moist-Master" System. Twin Sliding Crispers with glass tops. Vegetable Bin. Meat Compartment built in the freezer unit behind freezer door, 2 extra-fast Freezing Shelves, 8 lbs.—72 ice cubes with built-in Ice Tray Lifter and Speedy-Cube Release. New, flat, disc-type Kelvin Cold Control. Twin Dome Lights. Polarsphere sealed unit. Permalux exterior. Porcelain-on-steel interior. Kelvinator's price only . . $209.95*

KELVINATOR S-8. Compare with $220 refrigerators. A big 8.2 cu. ft. refrigerator with 16.3 square feet shelf space. Has Stainless-steel freezer with white Permalux-finished door. New type ice trays freeze 12 lbs.—96 cubes. Sliding glass covered Crisper, Glass Cold Storage Tray, Vegetable Bin, Automatic Interior Light. Beautiful Permalux exterior, stainless Porcelain-on-steel interior. Powered by Polarsphere sealed unit. Kelvinator's price only . . . $189.95*

KELVINATOR R-8. Compare with $250 refrigerators. 8.2 cu. ft., 16.3 square feet shelf space. Built-in Tray Release and Speedy-Cube release, 12 lbs.—108 ice cubes. Stainless-steel Freezer with new full height door. Twin glass covered Crispers, Twin dome Lights. Sliding porcelain Cold Chest, Vegetable Bin. Kelvin Control with Automatic return from defrosting. Sliding Adjustable Shelves. Powered by Polarsphere sealed unit. Kelvinator's price only $209.95*

KELVINATOR HD-8. Compare with the finest refrigerators at any price. A new de luxe 8 cu. ft. model completely equipped including a "Moist-Master" System. 15.9 square feet shelf area. Twin Sliding Crispers with glass tops. Twin Dome Lights. Meat Compartment built in freezer unit behind door, built-in Ice Tray Lifter and Speedy-Cube Release, 12 lbs.—108 ice cubes. New, flat, disc-type Kelvin Control. Vegetable Bin. Polarsphere sealed unit. Kelvinator's price only $239.95*

For 1940 Kelvinator Presents The Electric Range That Has Everything!

It's New from start to finish! Designed and built by Kelvinator. Has all the features and eye appeal women want in a modern electric range . . . Priced Competitively Low!

Here's the line that "has everything", including all time-proved features, plus extra KELVINATOR EXCLUSIVES that give Kelvinator dealers a big competitive advantage.

WE STARTED from scratch on these big Kelvinators. When we were through building, we had something *absolutely new*. Compare them, feature for feature, with any range on the market. There isn't one that can match them.

Look at Kelvinator's *oversize*, flood-lighted 16" x 16" x 19" oven. Has *two* high-wattage heating units, for fast pre-heating and "even" heat.

And here's a Kelvinator "plus"—a new-type Cooking Timer that eliminates "counting back" to figure out correct setting. In Kelvinator's de luxe model this Cooking Timer controls *three* positions . . . can be connected to oven, Scotch Kettle or appliance outlet. Controls fourth position when Scotch Kettle is installed in drawer.

Each Kelvinator Chromalox surface unit has *five* heats controlled by switch-knobs set in a recessed flood-lighted panel. And each switch-knob has its own "heat signal" light.

Kelvinator household models are built to give maximum rigidity—with one-piece, welded body, vitreous porcelain-on-steel. Finest glass-wool insulation—three inches on top and two on sides, back and bottom. All switches, oven thermostats, built-in timers—front serviced.

Quality features, eye-appeal and competitive prices—all are there to enable Kelvinator dealers to quickly make money in this tremendous, new appliance market.

In a recent national survey, 33.4% of fuel range owners interviewed said their NEXT range would be electric. This shows millions are range prospects *right now*.

The time is ripe for you to get a big piece of this business, with a product that's *years ahead* of competition! Tie in with Kelvinator's big electric range advertising campaign featuring "the range that has everything"—in color ads in national magazines . . . local ads and sales promotion materials.

By itself, Kelvinator's range line fits into any appliance dealer's business. With Kelvinator's refrigerator franchise, it gives you a *double* profit-opportunity! Get all the facts from your nearest distributor or factory branch—or wire or write today to Sales Dept., Range Div., Nash-Kelvinator Corp., Detroit, Mich.

MODEL ER-59. De luxe model, newly designed. Equipped with built-in Cooking Timer combining electric clock, automatic Computing Timer, Signal Light and Minute Minder with 60-minute dial. Kelvinator Selector Switch connecting Cooking Timer with oven, Scotch Kettle or appliance outlet. Automatic Oven Flood-light, individually lighted Switch Knobs in recessed panel. Warming drawer compartment with automatic Temperature Control. Plus all the general features.

EVERY 1940 KELVINATOR HOUSEHOLD RANGE HAS THESE IMPORTANT FEATURES

5-Speed Kelvinator Chromalox Surface Units • Over-size two-unit oven • Porcelain enamel on steel cabinet • One-piece welded body construction • 5-Heat bi-rotary, silver contact surface unit switches • "Broil" and "Bake" Pilot Lights • Recessed, slanting switch panel • Utility Drawer • Combination broiling pan with non-tip grille • 6-quart Scotch Kettle • Combination oven switch and thermostat with pre-heat cut-off • Heat-seal, counterbalanced oven door with broil stop.

MODEL ER-49. New design. Has all the de luxe features of the ER-59 except the Automatic Cooking feature. Built-in Minute Minder, Super-Fast 5-Speed Kelvinator Chromalox surface units, individually lighted recessed Switch Knobs, Over-sized Oven with Automatic Flood-light, Warming drawer Appliance Outlet. Plus all general features.

MODEL ER-39. Beautiful new design loaded with features for the woman who wants a high quality range at a moderate cost. Includes all general features plus automatic Oven Flood-light, Cooking Top Light, Appliance Outlet. Super-fast 5-Speed Kelvinator Chromalox surface units and 3 Utility Drawers. Warming drawer, slight extra cost.

MODEL ER-29. Full cabinet model, beautiful new design equipped with Super-Fast 5-Speed Kelvinator Chromalox surface units, "broil" and "bake" Pilot Lights, Has Combination Oven Switch and Thermostat with automatic pre-heat cut-off, Appliance Outlet on wall guard, large Utility Drawer—plus all the other general features.

MODEL ER-19. A low-priced, semi-leg, leader model, with sound selling features including 5-Speed Kelvinator Chromalox Heat-Flo surface units, Utility Drawer, Appliance Outlet, oversized Two-unit Oven with one-piece Porcelain enameled lining, Oven Switch and Thermostat with automatic pre-heat cut-off—plus all other general features.

Kelvinator's New 1940 Washers "The 5-Star Value" Backed by "The 5-Star Program"

Even Hotter than our Champion 1939 line. You know there are no finer features than Kelvinator's Fin-Flex Agitator and Fabric-Saver Wringer with Pressure Pilot. Now imagine how these improved 1940 Products will sell!

IT WAS A TALL ORDER for us to improve on those 1939 Kelvinator Washers that were acknowledged to have as much eye appeal, to be as efficient and quiet as any washer on the market.

But we did it.

And along with this "5-Star Value" we are giving you *the strongest selling story* a dealer ever had—proof of faster, cleaner, safer washing action—all in a ten-minute demonstration any salesman can make. This "5-Star Program" includes newspaper advertising on a liberal cooperative basis . . . printed literature . . . special Point-of-Sale Displays that are new and different . . . made-to-order Promotions and Traffic-Building plans . . . New Big 4 Financing Floor Plan that enables you to put this entire program into operation at once.

Look at the four washers illustrated—they are truly 5-Star Values. Check over these values and you'll agree . . . ★Beautifully styled; finished in gleaming baked Permalux . . . ★Fabric-Saver Wringer with the Pressure Pilot; safe for the user and safe for clothes . . . ★Fin-Flex Agitator that washes faster and cleaner than ever . . . ★Silent-mesh transmission; a really trouble-free mechanism . . . ★The Kelvinator Name; recognized by the public as a standard for dependable quality merchandise.

Here are real values—The 5-Star Values. And there's a model for every budget—each one featured for STEP-UP selling.

What's more . . . there's PLUS profit for you in the Kelvinator prices. There's a full line—with every feature that *sells.*

Look these washers and ironers over carefully. You can see for yourself—that this is the line you can *sell*—at a profit—in 1940.

1940's BIGGEST WASHER VALUE!

Kelvinator Washer Model 9D . . . Beautiful . . . quiet and dependable! Look at these features that prove Kelvinator's superior quality:

★ Fabric-Saver Wringer, balloon type rolls, 4 coil springs. Pressure Pilot shows correct settings for all fabrics. Extra safe with instant action, bar-type pressure release. Has full Underwriters' Laboratory approval.

★ New, improved Fin-Flex Agitator of nickel-chrome protected aluminum . . . cleanest-washing, *gentlest* type designed.

★ Silent-mesh transmission . . . only 5 moving parts . . . oil supply sealed-in . . . so quiet you can't hear it run.

★ Rigid construction, one piece base. White durable, baked Permalux finish.

★ Tub is gleaming white Porcelain Enamel, inside and out. 10 lb. washing load.

★ Automatic timer shows recommended time for washing various materials. Stops machine at predetermined setting.

★ Large rubber wheels . . . locking-type Casters . . . foot-control Clutch.

★ Unexcelled value with exclusive features.

MODEL 5-D—KELVINATOR QUALITY throughout. Bar-Spring Wringer with Balloon-type Rolls and Safety Release on both sides . . . Fin-Flex Agitator . . . 7 lb. washing load . . . Silent-mesh Transmission . . . Tub is white Porcelain Enamel inside and out—white baked Permalux base.

MODEL 7-D—FOR BETTER PERFORMANCE. Fabric-Saver Wringer with Pressure Pilot. Tub is white Porcelain inside and out—8 pounds washing capacity. Base of white baked Permalux. Silent-mesh Transmission with only 5 moving parts sealed in oil. Locking-type Casters.

MODEL 8-D—LARGER CAPACITY. 9 lbs. washing load. White Porcelain Tub. White baked Permalux base. Locking-type Casters. Nickel-chrome protected aluminum, Fin-Flex Agitator. Fabric-Saver Wringer with Pressure Pilot. Silent-mesh Transmission with only 5 moving parts.

KELVINATOR IRONERS FOR 1940—A WORTHY COMPANION LINE TO GET THOSE EXTRA SALES

MODEL 30-D. Portable table model. Finished in lustrous white baked Enamel. Has thermostatic Heat Control and pilot light signal to show when current is turned on. Easily operated by finger-tip and foot pressing Controls. Heavily padded roll twenty-one inches long . . . five inches in diameter, both ends open.

MODEL 59-D. White baked Enamel finish. Equipped with flush-type, fold-down Utility Shelf. Selective knee and finger-touch Button Control of shoe operation. Thermostatic Heat Control. Emergency release Lever located on shoe. Has special Ruffler Plate for fancy frills. Mechanism operates in continuous bath of oil.

MODEL 69-D. All white cabinet type. Selective knee and finger-touch Button Control of shoe operation. Equipped with flush-type End Shelf. Emergency Release mechanism located on shoe. Selective thermostatic Heat Control. Special Ruffler Plate on shoe for fancy frills. Mechanism operates in bath of oil.

MODEL 89-D. All white de luxe cabinet type. Two-speed motor. Selective knee and finger-touch Button Controls. Hardened steel, chrome plated shoe, with 2 thermostatic Heat Controls. Equipped with flush-type End Shelf. Pilot light shows when heat is on. Special Ruffler Plate for fancy frills. Emergency Release Lever on shoe.

"Demonstration order" supplied and made up by utility facilitates dealer-customer negotiations for commercial lighting installations

salesman calls upon the customer with samples of the adapter units being campaigned among small merchants. A definite attempt is made to sell the equipment as a logical step in light conditioning the prospect's store. Upon creating the desire to purchase the equipment, on the part of the customer, the lighting salesman makes out the "Demonstration Order" (shown), upon which is entered the name and address of the dealer, the details of quantity, type and cost, and the name and address of the customer. The customer signs the "order" indicating that upon satisfactory installation of the equipment a sale may be completed. This completes the lighting salesman's part in the transaction.

The order is made out in triplicate. One copy is retained by the customer; the second is sent to the dealer or distributor, and the third copy is retained by the lighting salesman. When the dealer, or distributor receives his copy of the order he delivers the equipment. When the equipment arrives on the customer's premises the deliveryman asks for the customer's copy of the "Demonstration Order." This then becomes a verification of the fact that delivery has been made to the correct address and that *upon execution of the dealer's sales order* the sale is complete and the money should be collected. The customer's copy of the "Demonstration Order," together with the original, is then marked "completed" and mailed back to the utility lighting department, where it becomes proof that the job is completed as recommended and the equipment is in use.

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Fluorescent for Advertising Value

Development of the new fluorescent lamp, although not strictly a load builder, has made possible many interesting installations, particularly where the color of the lighting and the advertising value are of predominant importance.

Such an installation is Van de Kamp's Holland-Dutch Bakers, Inc., located at 2930 Fletcher Drive, Los Angeles, Calif. Van de Kamp's is famous throughout southern California for its fine bakery goods and operates a chain of retail stores, including the sale of bakery products. This particular installation is the first to include the operation of a cafe and "drive-in" sandwich stand with the bakery.

As is the case with many structures in southern California, the architecture of these retail stores is strikingly modern. As a part of the building, there is mounted a modernistic Dutch windmill, the windmill being a trademark of the Van de Kamp organization, and is easily recognizable on its retail stores.

In this particular installation the windmill vanes are outlined in blue tubing and the windmill proper is floodlighted with four 750-watt troughs, located at the base of the tower. The indirect cove under the canopy is red and the pylon is gold.

To provide light under the canopy are down lights, using flush mounted lenses, 27 being equipped with 200-watt lamps and 42 with 150-watt lamps. The cove for the dining counter area consists of two rows of white fluorescent lamps. The intensity at counter level is 35 ft.-candles. All other areas consist of one row of tubes, resulting in intensities averaging between 20 and 25 ft.-candles. The general lighting in the bake shop is supplemented by six 150-watt lenses, mounted flush in the ceiling, focused on the display cases. The intensity on the bakery cases runs 50 ft.-candles.

The installation is attractively colorful without being gaudy. The important factor in the sale of this lighting installation was the co-operation between the owner's architect, Joseph L. Field; the electrical contractor, Occidental Electric Company; the light fixture builders, Light Control Company and Cogar Brothers, and the utility lighting engineer.

The architect's drawing and lighting layout were changed on several occasions to make possible the correct application of the lighting.

Van de Kamp's is very keen to take advantage of advertising opportunities. The main purpose of the fine lighting in this retail store was to emphasize the advertising value of lighting. The additional load on this installation was 27.3 kw. over and above what was originally planned. There are about 10.3 kw. in incandescent and 17 in tube lighting.

The cost to the utility of obtaining this additional load amounts to approximately only 1½ month's bill.

10 kw. of incandescent and 17 kw. of gaseous are combined in this ultra-modern Los Angeles commercial job. Cafe, bakery and sandwich stand are electrically equipped

A great new line of Ranges and a great New Calrod

NEW CALROD

Is Faster, More Efficient, More Durable Than Ever. Less Wattage—Lower Operating Cost

Hotpoint gives you the greatest electric range selling feature of the year—sends a vast new army of interested buyers to your door—with sensational new "self-cleaning" Calrod coils actually faster, more efficient and more durable than ever before!

And—more amazing still—with all its vastly improved performance, the new Calrod shatters all former records for economy, using less current than ever!

Here's a star, right out of the Hotpoint laboratories, that has the dollar sign of profit tied to it! Tie to it, too, right now! Let the new Calrod, and Hotpoint's brilliant new line of electric ranges for 1940, pull your sales to the greatest heights they've ever known!

NEW HI-SPEED CALROD—*Faster starting, more efficient, more durable than ever before—yet uses less current! Cash in on this sensational new feature—the greatest electric range innovation of the year.*

Simply lift the Calrod unit and the reflector "pops" out for quick, easy cleaning. No tools, no struggle, no "messin' around." A sure-fire hit with women.

Easy to clean—normal spillage i quickly consumed in the glowin heat of the self-cleaning coils Should excessive spillage occur, th reflector can be quickly removed

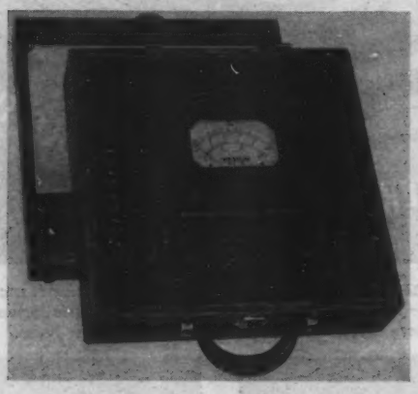
EDISON GENERAL ELECTRIC APPLIANCE CO., Inc
5618 West Taylor Street, Chicago, Illinois

CROWNING 30 YEARS OF LEADERSHIP

NEW EQUIPMENT

Circuit Tester

A standard unicell on all ranges where any appreciable current is drawn by the ohmmeter circuit is employed by this tester. In addition, two 7.5-volt batteries are used to supply energy for the high resistance ranges only. The instrument accuracy on d.c. voltage and current measurements is within 2 per cent (excluding the 1,000 volt range, which has an accuracy within 3 per cent). Because



Model 785 circuit tester for voltage, current and resistance measurements. **Weston Electrical Instrument Corp.**, Newark, N. J.

of the new temperature-compensated rectifier circuit employed, a high accuracy on a.c. voltage of within 3 per cent is permitted. The sensitivity of the instrument permits voltage, current and resistance measurements on oscilloscope circuits. Some of its applications include checking sensitive relays, signal systems, measuring a.c. and d.c. commercial motor voltages, etc.

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Capacity Indicator

"Motormike;" for use as a motor-starting capacitor indicator; can be used as an emergency condenser for 110-volt, 60-cycle motors with 54 mfd. to 180 mfd. range in six steps. **Sprague Products Co.**, North Adams, Mass.

Motormike is contained in a 7⅛ x 6½ x 6-in. steel case with a carrying handle. It contains extra heavy-duty condenser sections, which the company claims can stand overload and can be used for continuous motor-starting service if desired. Fustats are an added protection. This unit is designed for use by motor repair shops, refrigerator repair men, etc. It is said to be particularly valuable when used in conjunction with motor-starting capacitors.

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Electroplating Equipment

Fan-cooled copper-oxide rectifier for electroplating; output of 1.8 kw.; 6-volts d.c., 300 amp., and 12-volts d.c., 150 amp.: for control a voltage regulator with 36 steps. **General Electric Co.**, Bridgeport, Conn.

In applying the rectifier to electroplating, separate units can be used for each electroplating tank in place of a large unit serving several tanks, as is customary with rotary equipment. The company claims that with this arrangement, approximately full-load efficiency can be maintained at all times because rectifiers can be shut down on any tank not being used, and that each rectifier can be adjusted to the voltage required by its particular tank, thus eliminating the use of a tank rheostat with its inherent losses. Several sizes of regulators are available so that any number of parallel rectifier units, from one to seven, can be controlled simultaneously from one regulator. The regulator also provides control for starting and stopping the rectifiers.

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Self-Locking Nuts

An expansion of the present line through the introduction of nine new types of nuts. **Elastic Stop Nut Corp.**, Elizabeth, N. J.

All the nuts in this line have the self-locking element, a resilient non-metallic collar, built into the head of the nut. The new types are designated as thin hexagonal, spline, internal wrenching, countersunk and counterbored one-lug anchor, countersunk and counterbored two-lug anchor, countersunk corner anchor, bracket anchor, floating right-angle anchor, and floating basket anchor.

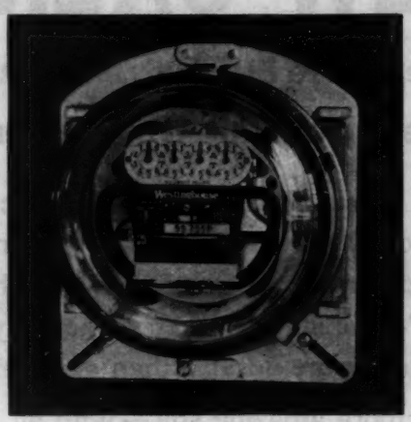
Who Makes What?

"Electrical Buyers Reference;" published annually. **Electrical World**, 330 West 42d St., New York, N. Y.

Names, addresses and products of electrical manufacturers are catalogued in this convenient, annual publication for public utility, industrial, engineering and other major electrical buying interests.

Portable By-Pass

A compact lightweight socket meter by-pass apparatus for use on single-phase sockets, which are not equipped with built-in circuit-closing device, it permits testing or replacement of socket type meters in the field without any interruption of customer's service. The by-pass



Portable by-pass for socket meters, No. SB-1; for loads up to 100 amp.; total weight 20 oz. **Anchor Mfg. Co.**, Boston, Mass.

frame is provided with a simple, rugged, openable link at top, for compactness in carrying. It also permits the user to have the frame in two pieces when placing it around the meter.

•

Starting Switches

Thermal starting switches for fluorescent lamps. **Carlton Lamp Corp.**, Union City, N. J.

This company announces the addition of thermal starting switches for 15-, 20-, 30- and 40-watt fluorescent lamps.

•

Blueprint Machine

Blueprint machine embodying a high-pressure mercury quartz lamp. **Charles Bruning Company, Inc.**, New York, N. Y.

The high-pressure mercury quartz lamp takes the place of carbon arcs in blueprint machines. A lamp life of at least 1,000 hours without appreciable diminution of light volume during the life of the lamp is

EIRCE NO. 1358 RACKS

HAVE WADED THROUGH

COUNTLESS HAZARDS FOR MANY DECADES—AS ORIGINALLY DESIGNED—STILL PROVIDING THE ULTIMATE IN SERVICE AND THE MINIMUM IN MAINTENANCE—TRIUMPHANT IN THE FACE OF COUNTLESS IMITATIONS.

HUBBARD AND COMPANY

PITTSBURGH — OAKLAND — CALIFORNIA — CHICAGO

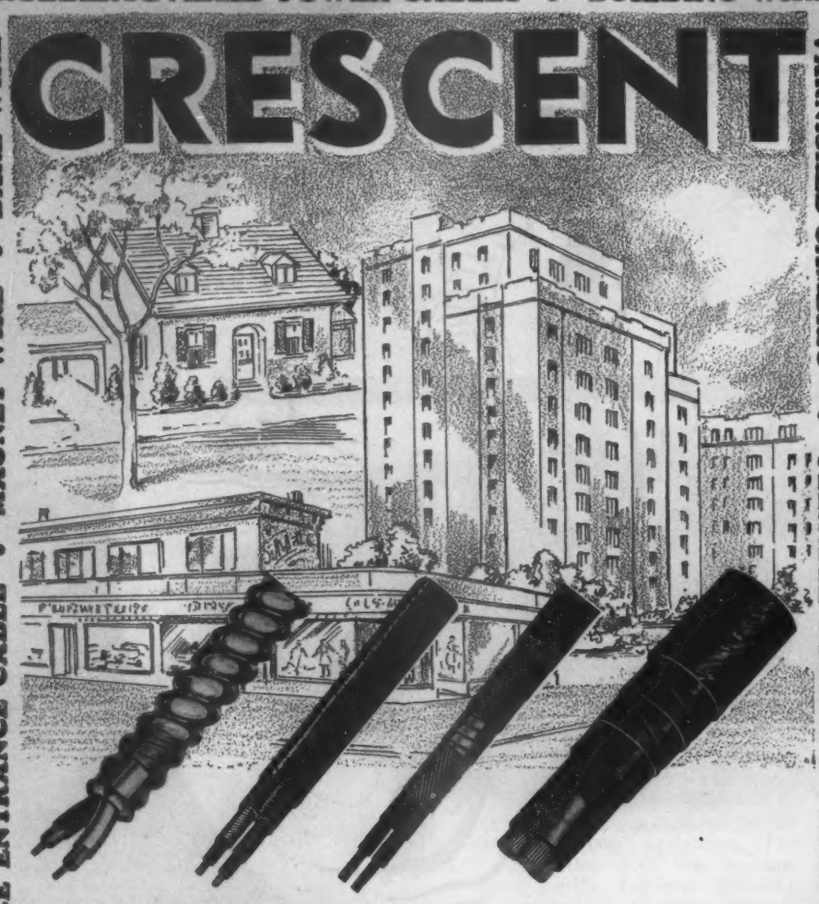
"HANG THE LOAD ON HUBBARD HARDWARE"

RUBBERCOVERED POWER CABLES • BUILDING WIRE

CRESCENT

VARNISHED CAMBRIC • FLEXIBLE CORDS • LEAD ENCASED AND PARKWAY CABLES • ARMORED CABLE

CRESFLEX NON - METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE



STANDARD FACTORY FABRICATED

WIRES and CABLES

For Homes, Farms, Apartment Houses, also Stores and other Commercial Properties. With greater uniformity in physical characteristics and higher quality, they assure easier, speedier and more profitable installation at the lowest possible cost.

A.B.C. Armored Bushed Cable—
Most suitable for installation where water pipe grounding system is available.

CRESFLEX Non-Metallic Sheathed Cable—
Better suited for installation where water pipe grounding system is not available.

SERVICE ENTRANCE CABLE—
From power line to service switch.

PARKWAY CABLE, Metallic and Non-Metallic—
Installed at lowest cost underground without other protection.

CRESCENT INSULATED WIRE & CABLE CO. INC.
TRENTON, NEW JERSEY

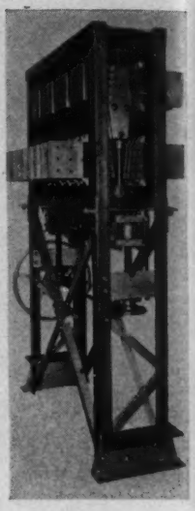
Atlanta Baltimore Boston Buffalo Chicago Cincinnati Cleveland
Detroit Indianapolis Kansas City Los Angeles Minneapolis
New Orleans New York Philadelphia Pittsburgh St. Louis San Francisco

CRESCENT ENDURITE SUPER - AGING INSULATION

guaranteed by the company. It is claimed that current consumption of this printer is only one-third that of a carbon arc machine of equal capacity. Additional features claimed are mechanical innovations in safety, improved feeding, speed control, drive and elimination of tracing slippage and wear.

•

High-Ampere Switch



Double throw, it permits easy and rapid switching of an eight-coil furnace transformer without changing heavy cables. The series parallel interconnections are completely factory assembled, so switch can be connected directly to transformer leads.

High-ampere switches for electric furnace transformers. **Delta-Star Electric Co.**, Chicago, Ill.

•

Liquid Level Gauge

A remote reading liquid level gauge for petroleum and allied products storage fields where large quantities of liquids are stored in tanks. **Guardian Electric Co.**, Chicago, Ill.

Unit consists of a fully-protected mechanism sealed in oil, housed in a heavy cast-aluminum tank head. Float displaces 1/16 in. of liquid, operates control mechanism on as little as a 4-ounce pull, the company states. An indicator panel can be connected to any number of tanks up to 24. This remote reading liquid level gauge may be used on tanks up to 50 feet in height.

•

High-Voltage Indicator

The indicator consists of a long bakelite tube terminating at the live end with a metal spike. A metal collar fixed around the outside of the tube forms the second plate of a condenser with the spike, the bakelite tube acting as the dielectric. A

High-voltage indicating equipment for use on lines up to 13 kv., furnished with two-range instrument with scales 0-7 and 0-14 kv. **Ferranti Electric, Inc.**, New York, N. Y.

2½-in. dial electrostatic voltmeter is connected in series with this condenser, one end of the instrument being terminated with a ground lead. The actual voltage across the instrument is 600 volts at full scale reading. Chief use is in power stations and sub-stations to ensure that normally live metal is dead before working

on it. An advantage over the usual neon lamp detector is that the exact voltage is shown.

•

Color Spotlight

"Roto-Color" spotlight; wheel is rotated by a synchronous motor, which operates on 110-120 volt a.c. **Mitchell Mfg. Co.**, 1550 Dayton St., Chicago, Ill.

The color wheel automatically revolves, producing four complete color changes (red, green, amber and blue) every thirty seconds. This makes it ideal for window displays, sign displays, etc. It can be quickly mounted on ceiling, wall or floor and is easily adjustable so that the beam can be directed to any location desired.

•

Photoelectric Relay

A new compact photoelectric relay which can be used for counting, sorting, weighing, measuring, signalling, and similar functions. It has two normally open and two normally closed contacts, each rated at 10 amperes on 115 volt a.c. circuits. Increased sensitivity is obtainable by means of a condensing lens. The unit may be wall or bench mounted with open wiring, or with concealed or exposed conduit.

Type "RQ" Photo-Troller, a photoelectric relay operating on a change of 40 foot-candles, if not more than 15 foot-candles of extraneous light is present. **Westinghouse Electric & Mfg. Co.**, East Pittsburgh, Pa.

•

Faceshields

A new line of faceshields for use on jobs where goggles are not absolutely required. **Mine Safety Appliances Co.**, Braddock, Thomas and Meade Sts., Pittsburgh, Pa.

These faceshields have such uses as welding in industrial sections. Pre-formed headgear, which conforms to the natural contours of the back of the wearer's head —as distinguished from ordinary oval "hat-band" construction—is a feature of this new line.

•

Fluorescent Fixture

"Super-Lite" fluorescent lighting fixtures for general illumination of industrial areas; a two-light unit for use on 60 cycle, a.c., 110-125 and 220-250 volt operation. **The Miller Co.**, Meriden, Conn.

Designed to be mounted 9 to 12 feet above the floor, this fixture is of open-end construction and utilizes the new Tulamp

Use Sherman Quality Made Splicing Sleeves . . . for Easy Handling . . . Better Service

Sherman Splicing Sleeves enjoy an excellent reputation in the power industry, for their splendid service qualities. These sleeves are made in a variety of styles, to satisfy virtually all wire or cable splicing requirements, and comply with N.E.L.A. specifications.

Only the finest of materials are used in Sherman Sleeves, and they are made by precision methods that assure freedom from burrs and other defects.

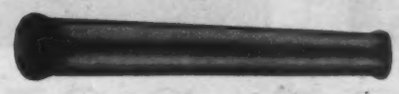
Write for Bulletin 20 describing the line—or let us send you free samples.

Split Tinned Sleeve

Highest quality drawn copper, dead soft annealed to allow tight clamping before sweating. Tinned with an alloy that facilitates sweating.

The "Figure 8"

Extra quality electrolytic copper of correct temper. Seamless and free from burrs.



Seamless Oval

Precision made from finest electrolytic copper to N.E.L.A. standards. Carefully grooved to prevent buckling.

Split Bolt Connectors

Highest grade bronze alloy with strong, clean, machine cut threads. Solid spacer, full hex head. With or without nut retainer.

Soldering Lugs

Heavily made from finest copper tubing. Comply with N.E.M.A.-N.E.L.A. standards. Fully interchangeable with cast lugs.

Wedge Grip Connectors

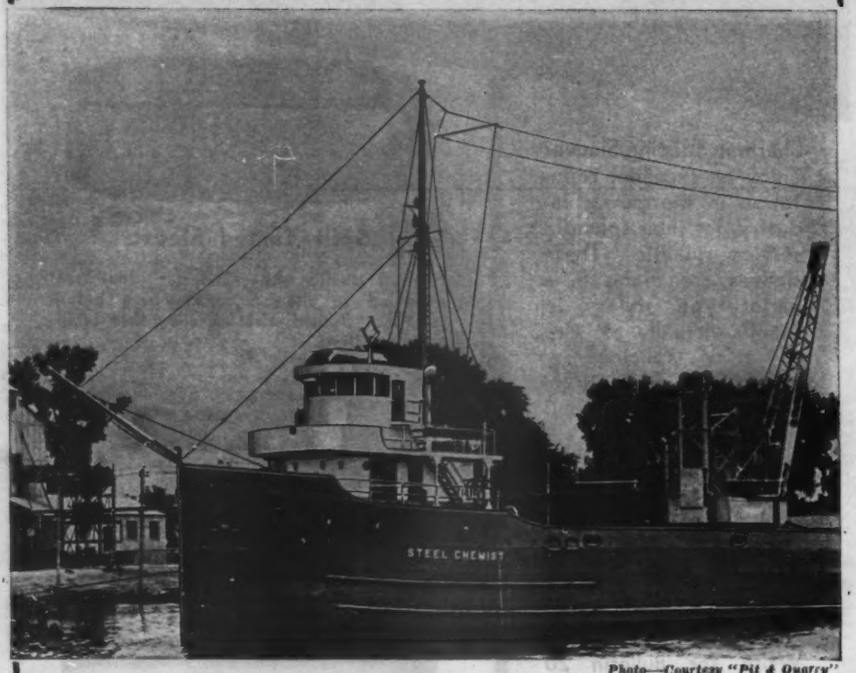
Pure copper. Designed to provide extra wedging and snubbing action. Non-removable screw.

Solderless Lugs

Pure copper. Inexpensive, one-piece design. Makes unusually rigid assembly. May be soldered if desired. Completely interchangeable with corresponding standard lug.

H. B. SHERMAN MANUFACTURING CO.
BATTLE CREEK, MICHIGAN

EC&M NEO-TIME STARTER meets requirements of Limited Generator Capacity

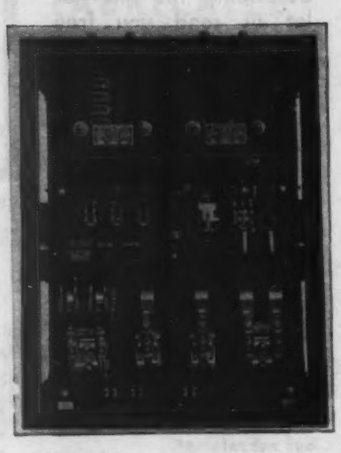


Photo—Courtesy "Pit & Quarry"

When adding a large, electric motor-driven, rotary air compressor to this Lake Freighter, it was necessary to keep current peaks at a low value during starting in order not to overburden the capacity of this ship's direct current generator.

To meet this requirement, the ship owners selected an EC&M NEO-TIME Starter of heavy duty design for the 150 HP, 230 Volt compressor motor. Long-time acceleration on the starting resistors is provided by EC&M NEO-TIME Control—a simple, flexible, *electronic-timing* system, which is easily adjustable over a wide range from a few seconds up to several minutes per step as required.

The starter is shown with front-door and screwed-on-side-plates removed; starting resistors being mounted in the top of the enclosing cabinet. This provides a compact, self-contained, easily installed unit.



NEO-TIME unit is mounted on upper right of this 150 HP Starter-panel and has front-cover removed. Adjustment is made by simply turning a small dial. Could anything be simpler or quicker!

EC&M NEO-TIME Control is a sturdy, flexible, *electronic-timing* system for successfully solving . . . acceleration problems . . . industrial timing problems. Put your requirements up to EC&M NEO-TIME Control.

THE ELECTRIC CONTROLLER & MFG. CO. E&M CLEVELAND, OHIO

HEAVY DUTY MOTOR CONTROL FOR CRANES, MILL DRIVES AND MACHINERY • BRAKES • LIMIT STOPS • LIFTING MAGNETS AND AUTOMATIC WELD TIMERS.

ballast with starting compensator which is claimed to have a high power factor, provides a better regulation of voltage and minimizes stroboscopic effect. The fixture is constructed of steel porcelain-enameled.

•

Lift Truck

With this lift truck one man can handle cable reels, emptied or loaded, with speed and safety. Cable can readily be paid out while the reel is suspended on the trun-

Lift truck facilitates handling of cable reels. **The Barrett-Cravens Co.**, 3255 West 30th St., Chicago, Ill.

nions of the truck. Construction is rugged and the design is such that reels of any diameter can be handled in warehouses, factories and on installation jobs.

•

Sun Lamp

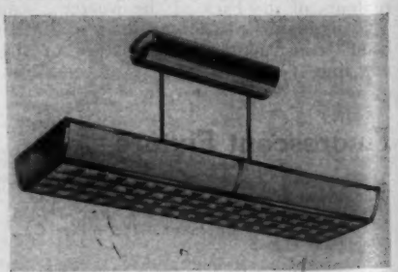
Type S-4 sun lamp; produces ultraviolet radiations for home as well as for animal and poultry husbandry. **Westinghouse Electric & Mfg. Co.**, Bloomfield, N. J., and **General Electric Co.**, Nela Park, Cleveland, Ohio.

Heart of the sunlight lamp is a quartz capillary element about half the size of a cigarette. Enveloping this little bulb is an outer bulb identical in size and shape with that of the ordinary 60-watt lamp. Made of clear ultraviolet transmitting glass, this outer bulb is said to screen out the undesirable short rays emitted by the inner element.

•

Fluorescent Unit

This unit consists of an all-steel, electrically welded frame in which are inserted sheets of translucent plastic. It can be mounted directly onto a stud and, by dropping the canopy, wired in the open. Lamping and relamping are done from the top of the reflector. The lamp starters are mounted in the reflector, accessible from the outside of the fixture. The canopy houses two high power-factor ballasts. The company claims a resultant power factor of above 95 per cent.



"Brigadier" fluorescent unit using four 40-watt fluorescent tubes. **F. W. Wakefield Brass Co.**, Vermilion, Ohio.

For the good of your heating load ... we are addressing this series of ads to Electrical Dealers

WHY SMALL SALES LEAD TO BIG SALES

This lady is about to buy a toaster or, say, a roaster. Its element is made of Chromel, but of course the lady doesn't know that. As time moves on what she does come to know is that she has bought a very good device. She becomes more and more sold on the advantages of electric heat, and finally becomes a good prospect for an electric range. In this way, the smaller Chromel equipped devices do a day-in and day-out selling job for you, free of charge. They not only help to sell additional heating devices, but also more appliances in general. You please your customer and help small sales grow to larger ones when you ask that your heating devices have Chromel elements.

CHROMEL
ELECTRICAL HEATING ELEMENT
WIRE
USED IN MILLIONS OF APPLIANCES

HOSKINS MANUFACTURING COMPANY
Detroit, Michigan

NEWS ABOUT PEOPLE

Jones Elected President of Cities Service Co.

W. Alton Jones, first vice-president of the Cities Service Co., since 1927, was elected president of that utility system at a special meeting of the board of directors held last week. He succeeds the late Henry L. Doherty.

Because of his activities in the old

National Electric Light Association, predecessor to the Edison Electric Institute, Mr. Jones was elected first vice-president of the association in 1929, and served as president from 1930-31.

Mr. Jones came to New York in 1921 from Missouri to become assistant to the late Frank W. Frueauff, partner of Henry L. Doherty. On the death of Mr. Frueauff, the following year, Mr. Jones took over some of his responsibilities and in 1925 he was made chairman of the executive committee of Henry L. Doherty & Co. In 1922 he was elected a director of Cities Service Co. His unusual ability as an executive and leader brought him further recognition when in 1927 he was elected first vice-president of Cities Service.

His business activity has been exclusively with the Doherty organization. His first position was that of cashier with the Webb City & Carterville Gas Co. at Carterville, Mo. In the fall of 1912 he was advanced to the position of cashier in the office of the Empire District Electric Co. at Joplin, Mo., where he advanced through various positions in the accounting and financial departments to assistant secretary, auditor and treasurer. During this period he also had charge of the rate department. Largely because of his record in handling the financial affairs of the Empire company during the trying war period he was called to New York in 1921.

•

▶ ALVIN J. WIRTZ has been appointed Under-Secretary of the Department of the Interior. A Texan by birth, Mr. Wirtz has devoted years to reclamation and conservation activities in his native state. He has been serving as general counsel of the Lower Colorado River Authority. In his new position he will succeed Harry Slattery, who resigned last October to become Administrator of the Rural Electrification Administration.

▶ ROBERT A. JONES has been appointed district engineer of the New York district of the General Electric Co. W. S. HILL was named assistant district engineer. Mr. Jones entered the test course of the General Electric Co. in 1916 following graduation from the University of Minnesota. In 1918 he was transferred to the industrial engineering department in Schenectady and was appointed engineer in the Syracuse office in 1923. He was sent to the Buffalo office as engineer in 1936, and in 1938 was appointed assistant engineer of the New York district. Mr. Hill joined General Electric in 1923 following graduation from the University of Nevada. He has been in the engineering department in New York since 1928.

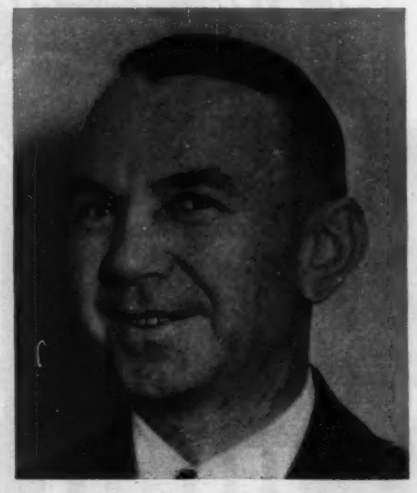
Spokane Utility Appoints McElroy Sales Manager

R. B. McElroy, formerly residential sales manager of the Washington Water Power Co., has been named general sales manager, according to a recent announcement by J. E. E. Royer, vice-president and general manager.

The position of general sales manager had been held by Lewis A. Lewis, assistant general manager and manager of the Spokane division of the company's operations, and the appointment of Mr. McElroy will relieve Mr. Lewis of general sales staff work.

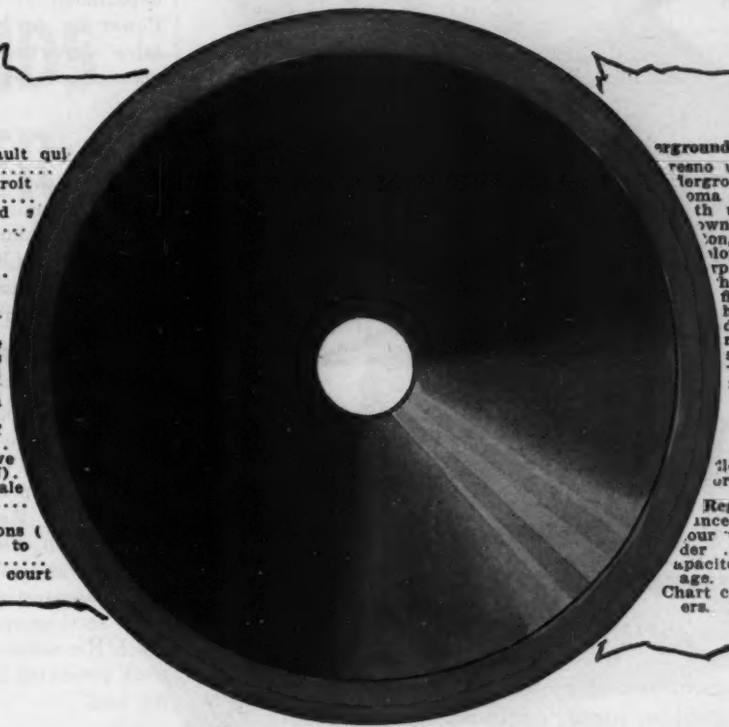
A native of Spokane and a graduate of the State College of Washington, Mr. McElroy went immediately into the sales department of the Washington Water Power Co. During the twenty-odd years spent with the utility he has held positions in the residential, commercial and industrial sales fields, specializing in merchandising.

Other changes announced, effective



January 1, are as follows: M. R. Lund, selected as general commercial sales manager; A. H. Wegner, sales manager of the Spokane division, and Frank Tool, formerly sales manager

THE LINES"
live NEWS topics



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Cable lengths for Detroit
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Machine tamps concrete
G. B. McCabe.....
Modernizing underground
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Under-sidewalk vault
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Vault design reduces inve
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Orangeburg Standard
FIBRE CONDUIT

Where good engineering practice requires concrete encasement, as in duct banks, main distribution, high tension and "downtown" underground, Orangeburg Standard Fibre Conduit offers not only immediate savings but complete and permanent cable protection and raceway facilities.

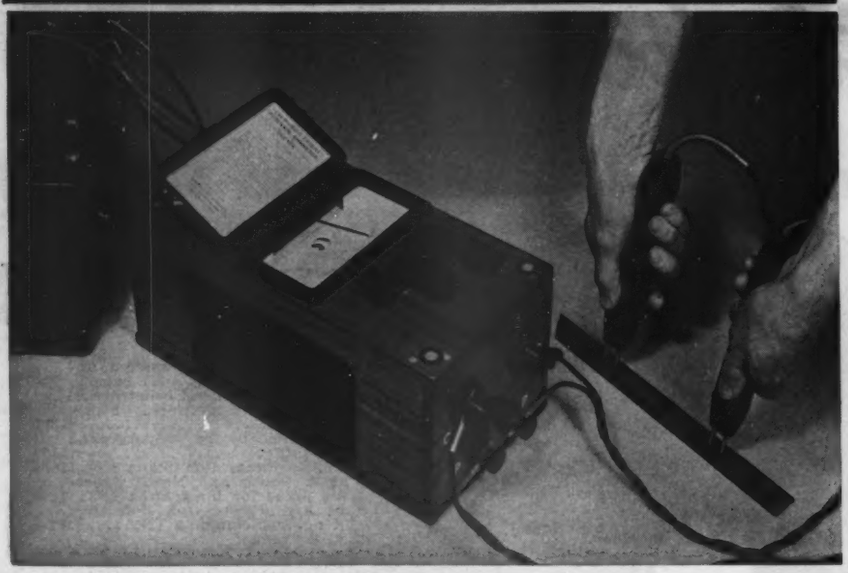
CONDUITS
construction

Designed for easy and speedy installation—a half century record of cable protection under all conditions of climate and soil means that engineers may confidently specify ORANGEBURG with full assurance that their decision will be justified.

THE FIBRE CONDUIT COMPANY

SALES OFFICE 292 MADISON AVENUE, N. Y.
Sales Agent: **GRAYBAR ELECTRIC COMPANY, INC.**
Sales Agent: **GENERAL ELECTRIC SUPPLY CORP.**

Measures
Switch and Circuit Breaker Contacts
down to .000001 ohm



"DUCTER" LOW RESISTANCE OHMMETER

—a direct-reading portable instrument for quick accurate measurements of low resistance

Without any adjustments or "balancing", this instrument gives direct pointer indications of resistance down to one *millionth of an ohm!* Simple, rapid, accurate and reliable for measuring armature, field and transformer coils, soldered joints, fuses, switch and relay contacts, and other low resistances. Saves time, trouble and calculations. A unique member of our famous "Megger" family of resistance-measuring instruments.

Detects Trouble in Oil Switches and Circuit Breakers

By supplementing your visual inspection of oil switches and oil circuit breakers with this dependable measurement of contact resistance, you can detect incipient troubles with certainty. Oxidized and pitted contacts, weak springs and contaminated oil are apt to raise contact resistances to points where an increased load causes real trouble. Simply open the disconnects, close the switch, apply the "Ducter" test leads and read the scale.

"MEGGER"

For further particulars, please write for new descriptive Bulletin 1635-W, now in preparation.

James G. Biddle Co.
1211-13 ARCH STREET Electrical and Scientific Instruments PHILADELPHIA, PA.

of the Spokane division, named as manager of residential sales.

Mr. Lund has been associated with the Washington Water Power Co. since 1924. For six years he was in the residential department, was transferred to the commercial department and became commercial sales supervisor.

A native of Kentucky, Mr. Tool joined the Washington Water Power Co. in 1927 as a residential salesman. He later became supervisor of suburban residential salesmen and sales manager of the Spokane division.

Mr. Wegner entered the engineering department of the Washington Water Power Co. in 1925, transferred to the sales department later and became manager of commercial sales.

•

▶ HENRY R. STEVENS, formerly in charge of the material and inspection section, Bonneville project, has been appointed senior hydraulic engineer on the staff of Charles E. Carey, chief consulting engineer. Succeeding to Mr. Stevens' former position is CARL H. BJORQUIST.

▶ JOHN H. KENT, manager for the Boston Edison Co. in the Newton and Needham districts, was guest of honor at a luncheon on January 2, marking his completion of 35 years of continuous Edison Association. Mr. Kent's son, Jackson, also a Boston Edison employee, was designated by Vice-President Thomas Carens to attach the 35-year service emblem to his father's lapel. His associates in public relations work presented him with a fitted traveling bag.

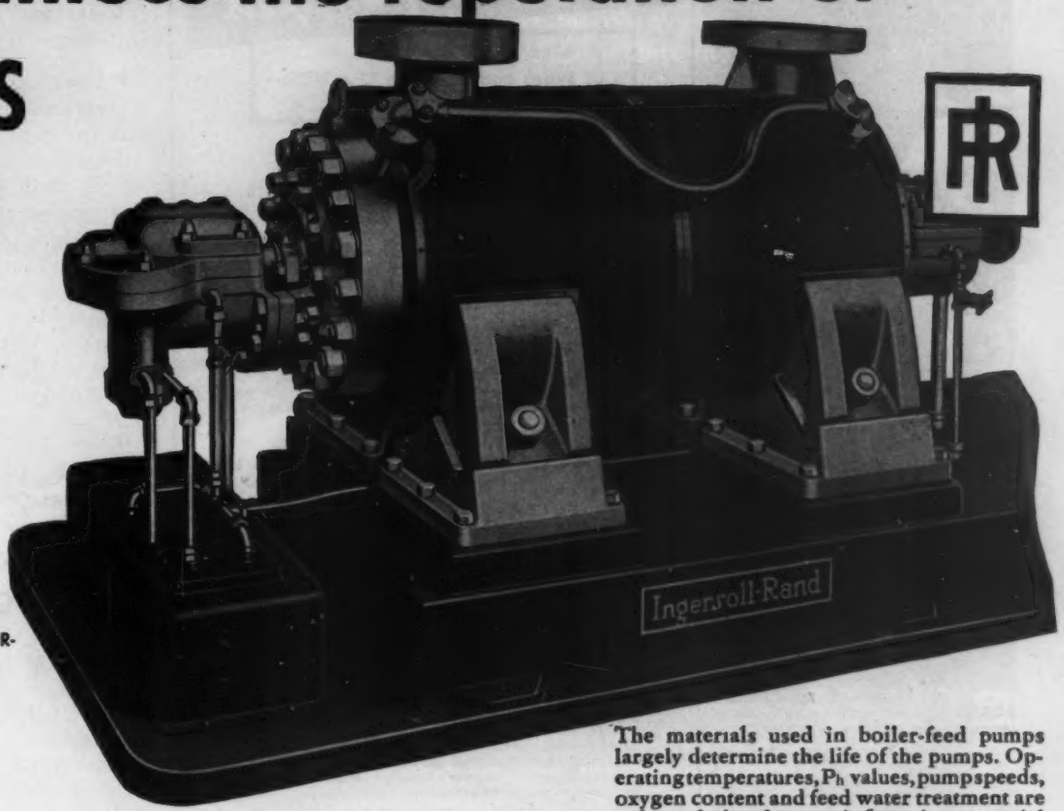
▶ HERBERT A. FIFE, superintendent of plant orders and records, engineering department, Commonwealth Edison Co., retired on January 1, after 40 years of service. Mr. Fife entered the company in 1900 as a stenographer in the engineering department. He became assistant to engineer of inside plant in 1923, chief clerk of the engineering department in 1932, superintendent in 1932 and superintendent plant orders and records in 1938.

▶ CAPT. H. RUSSELL STICKNEY, engineering analyst of the utilities division of the S.E.C. at Washington, D. C., has been appointed public service engineer of Providence, R. I. He was formerly connected with the Alabama Power Co., Birmingham; Westinghouse company, East Pittsburgh; with the former Charles H. Tenney organization, Boston, and Jackson & Moreland, Boston, besides having been electrical engineer of the submarine base of the U. S. Navy, New London, Conn., and for some time consultant of the U. S. Army Engineers. He was senior engi-

Ingersoll-Rand Metallurgy

guarantees the reputation of

THOUSANDS of BOILER FEED PUMPS



CLASS CHT BOILER-FEED PUMP

The materials used in boiler-feed pumps largely determine the life of the pumps. Operating temperatures, P_h values, pump speeds, oxygen content and feed water treatment are a few of the factors influencing material selection and heat treatment.

Ingersoll-Rand has outstanding metallurgical facilities and heat treating plants. Metallurgists with years of practical experience on boiler-feed pumps select the materials and control the heat treatments.

A recent field survey by I-R experts resulted in the development of new means of combating corrosion in boiler-feed pumps. This assures the selection of improved materials for certain installations. Such research is part of Ingersoll-Rand's determination to maintain leadership.

Ingersoll-Rand's experience in building Cameron boiler-feed pumps, as well as its experience on all types of pumps handling corrosive liquids, and its wide experience in the selection of materials for condensers, rock drills, air and gas compressors, Diesel and gas engines, etc., assures the user that his pump will be constructed of the very best materials for his particular installation. Specify Ingersoll-Rand for dependability.

Atlanta
Birmingham
Boston
Buffalo
Butte
Chicago
Cincinnati
Cleveland
Dallas
Denver
Detroit
Duluth
El Paso
Hartford
Houston
Kansas City

Ingersoll-Rand

Cameron Pump Division

11 BROADWAY, NEW YORK, N.Y. 77010

Knoxville
Los Angeles
Newark
New York
Philadelphia
Picher
Pittsburgh
Pottsville
Salt Lake City
San Francisco
Scranton
Seattle
St. Louis
Tulsa
Washington

HIGHWAY *Earth Boring* MACHINES

for SAFETY, SPEED, ECONOMY IN POWER LINE CONSTRUCTION AND MAINTENANCE . . . . *All Seasons of the Year*

TRAILERS: for every utility purpose

Available in a variety of types and sizes for TRACTOR *or* TRUCK MOUNTING . . .

WINCHES: several types and sizes

★ **Bores the Hole:**
From 6" to 48" in diameter—from 1 to 10 feet deep.

★ **Sets the Pole:**
Most Highway Earth Boring installations include a Highway Winch and Pole Derrick making the same unit equipped to "bore the hole" and "set the pole."

★ **Bores through Frost:**
Deep frost is no serious obstacle to this remarkable machine—an important point in cold weather maintenance or line construction work.

★ **Bores in Shale, Rock, and Hardpan:**
You progress economically and speedily in boring holes even where the ground conditions are tough.

★ **Bores in Sand and Gravel:**
Regardless of ground conditions, the Highway does its job with savings for you—it brings up the stones as well as the earth.

★ **Reaches 90% of all locations:**
Good or bad, the Highway gets there for you in almost every location you will operate—especially is this true of the crawler mounted tractor type machine.

★ **Bores at any angle:**
The boring head is adjustable—the hole is dug straight regardless of position of truck or tractor—adjustments made easily and quickly—no wasted time maneuvering machine.

★ **Bores Anchor Holes:**
Adjustability feature makes it easy to put an angular hole down as well as a straight one.

BODIES: for construction—maintenance—installation—service

POLE DERRICKS: several available sizes

WRITE FOR INFORMATION

HIGHWAY TRAILER CO.
EDGERTON WISCONSIN

neer for the Rhode Island survey of public utilities conducted in 1937-38 by Frederick A. Young. RALPH W. EATON, who has been public service and traffic engineer at Providence for some years, has been assigned to full-time work in the latter post, in order to concentrate exclusively upon problems of highway safety and related topics.

▶ R. C. NORBERG, vice-president and general manager of the Electric Storage Battery Co., has been elected president and general manager. He is succeeding in the presidency JOHN R. WILLIAMS, who has just retired after 45 years of service with the company.

▶ EDWIN M. MEYER has joined the organization of Victor Insulators, Inc., in the capacity of commercial and industrial engineer. His new duties will cover both sales and plant problems. A graduate of Armour Institute of Technology and Massachusetts Institute of Technology, he brings thirteen years of experience in high-voltage engineering, manufacturing and field work to Victor. He was electrical engineer for G & W Electric Specialty Co. of Chicago for four years and later served nine years as chief engineer for Porcelain Products, Inc., of Parkersburg, W. Va. In his new work he will be associated directly with P. W. Price, executive vice-president of Victor.

OBITUARY

J. P. W. Brown

J. P. W. Brown, whose death was announced in the January 6 issue of ELECTRICAL WORLD, had been prominently identified with the electric utility industry in Nashville, Tenn., for a number of years. At the time of his death he was general manager of the Nashville Electrical Service. He had formerly been vice-president of the Tennessee Electric Power Co., and when those properties were acquired by the city he became general manager of the service.

A native of Nashville, Mr. Brown was educated at Vanderbilt University. In 1898 he started his career in the electric power industry with the old Cumberland Electric Light & Power Co., Nashville; from 1899-1903 he served as head of the meter department of the Nashville Railway & Light Co., successor to the Cumberland company, then as assistant superintendent and superintendent of the electrical department, assistant general superintendent, general superintendent and in 1925 vice-president and general manager. In 1931, upon the merger of the company with Tennessee Electric Power Co., he was made vice-president of the new

Units with flush mounted relays and instruments . . . breaker being withdrawn on handling truck

ROLLER SMITH

METAL-CLAD SWITCH GEAR

Moderate Duty, Vertical Lift

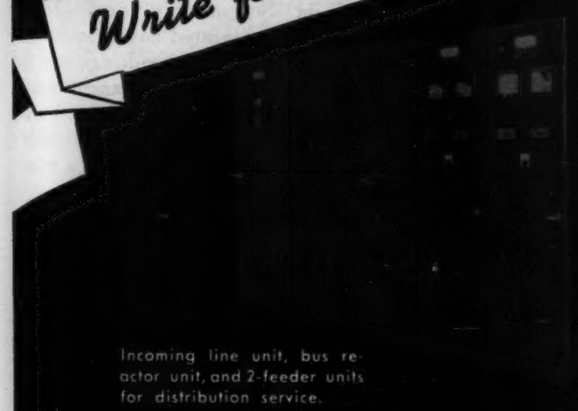
Here is a development by Roller-Smith to meet the call for adequate and economical control of generators and distribution facilities of central stations, industrial plants, office buildings, hospitals and similar institutions . . . with services of 5,000 volts or less at interrupting capacities of 25,000 and 50,000 KVA.

Write for copy of New **CATALOG 8-b**— *just off the press*

Engineers will be interested in the features of flexibility to meet, exactly, a wide variety of standard conditions and its easy adaption to special requirements. These are fully presented in the new Roller-Smith Catalog 8-b.

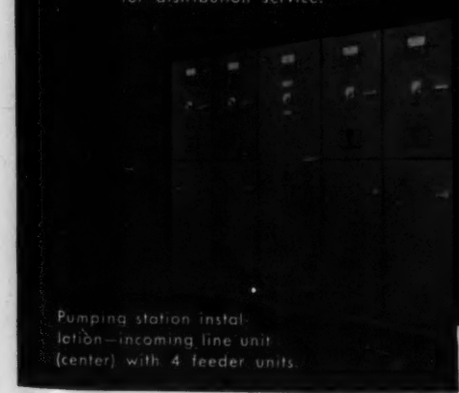
A copy of this special catalog gives illustrations, dimensional data, circuit arrangements and full specifications for indoor services.

Send for your copy of NEW catalog D-8-b.



Incoming line unit, bus reactor unit, and 2-feeder units for distribution service.

11-Unit generator and feeder installation for a steam power plant.



Pumping station installation—incoming line unit (center) with 4 feeder units.

ROLLER-SMITH COMPANY

Electrical Measuring and Protective Apparatus

ROLLER SMITH

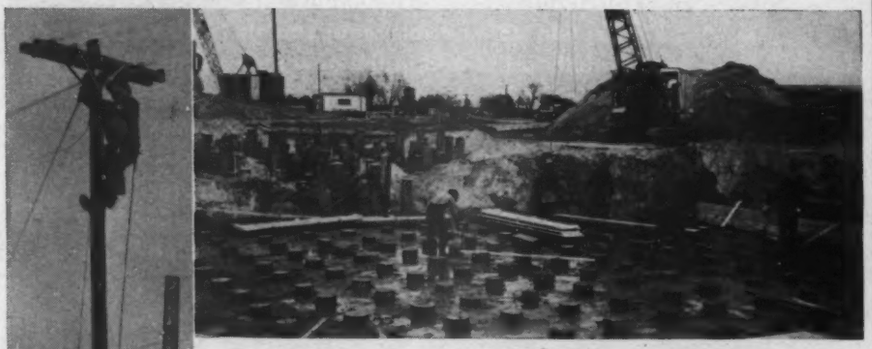
MAIN OFFICE AND WORKS **BETHLEHEM, PA., U.S.A.**

BIAS TAPES *with plenty of* **STRETCH!**

ACME bias tapes fit snugly around corners, into slots and over uneven surfaces because they have exceptional flexibility (stretch), and the tensile strength to stand the pull. These qualities are due to an Acme-developed process of applying pure vegetable oil varnishes of Acme formula to highest grade cotton fabric. Available in bias or straight tapes and rolls up to 36" wide—yellow or black. Samples if desired.

Acme Wire PRODUCTS

The Acme Wire Co., New Haven, Conn.
MAGNET WIRE—COILS—VARNISHED INSULATIONS—CAPACITORS



SERVICE RECORDS TELL THE STORY

"Dixie" DENSE LONGLEAF PINE

JACKSON LUMBER COMPANY POLES DIXIE PILING LOCKHART ALABAMA

POLES, PILING

& CONSTRUCTION LUMBER

CREOSOTED OR "WOLMANIZED"

For Quotations address: Treated Products Division

JACKSON LUMBER COMPANY

MACON, GEORGIA

A CROSSETT WATZEK GATES INDUSTRY

company and manager of the Nashville district.

In 1925 he was unanimously chosen as Nashville's most useful citizen.

•

E. W. Allen

Edwin W. Allen, whose death was announced in the January 6 issue of ELECTRICAL WORLD, had been vice-president of General Electric Co. since 1926. He entered the employ of the company as a student engineer in 1901, the year following graduation from Virginia Polytechnic Institute. He was

located in Schenectady until 1911, when he was appointed engineer of the central district with headquarters in Chicago. In 1924 he was named manager of the engineering department and transferred back to Schenectady. Two years later he was elected a vice-president.

From 1915 to 1919 Mr. Allen was in war service. Following the armistice he was ordered to duty with the War Damage Board of the Peace Commission and was sent to Brussels. Upon his return to this country in 1919 he resumed his duties with General Electric in Chicago. Mr. Allen was a fellow of the American Institute of Electrical Engineers and a member of the Western Society of Engineers.

•

▶ JOSEPH G. BROBECK, New York office manager for the Simplex Wire & Cable Co., Cambridge, Mass., died December 26.

▶ ROBERT W. WITHINGTON, president and owner of the American Insulating Machinery Co., Philadelphia, Pa., died January 5 at his home in that city, at the age of 71. Associated with the company more than fifty years, he succeeded his father, the late Ralph Withington, as president.

Business men turn naturally and expectantly to the advertisements in the magazines of their industry to keep up to date on available products and services. They are constantly looking for down-to-earth facts. Companies which supply this sort of dependable and useful information in their advertising in Electrical World know that the results are well worth the advertising effort.

THE JAMES R. KEARNEY CORPORATION of St. Louis has come far, in a hurry. From the very beginning of its corporate life persistent, informative and forceful product advertising in ELECTRICAL WORLD has gone hand in hand with the sales force. This is how James R. Kearney, Jr., Executive Vice-President, explains it:

"The James R. Kearney Corporation began modestly in 1926 with a handful of men and a few carefully tested products which were the result of Mr. Kearney's active experience in the electrical field; one of the primary factors in the original organization plan of the business was a definite program of advertising.

"ELECTRICAL WORLD, one of the favorite publications of Mr. Kearney and his associates, was recognized then, as now, as one medium which served the operating men in the electrical transmission and distribution field in the capacity of current news of the industry as well as a purchasing guide.

"At no time since its beginning has the Kearney Corporation failed to recognize the necessity of using advertising space in business publications, along with other forms of advertising, as a vital factor in producing acceptance, creating good will and stimulating sales. In good times and in bad, it has been the policy of this company to tell by printed word, as well as by oral salesmanship, the functions, advantages, efficiency and economy of various Kearney products."

THE CONTINENTAL-DIAMOND FIBRE COMPANY of Philadelphia may rightfully claim a commanding position in the important field of electrical insulation; and, as is true with nearly all successful companies, publication advertising has played a conspicuous part. In the words of Nelson W. Sieber, Advertising Manager, we again find ELECTRICAL WORLD taking a lead role:

"To make a long story short, after making surveys both by mail, directly with our customers and prospects and through our sales force, we always found ELECTRICAL WORLD *to be preferred and to be read in every branch of the industry and by every type of individual that we were interested in reaching. Naturally, therefore, we depend on* ELECTRICAL WORLD *to carry the burden of getting our story to the electrical industry as a whole, and that is why we have consistently advertised in it year after year and have always tried to present our message in an effective manner and in keeping with our leadership in the insulating branch of the electrical industry."*

Many and varied are the idea as to what constitutes good advertising performance. Running through successful campaigns in Electrical World is a common denominator worthy of note: A consistent schedule of thoroughly informative copy . . . so presented that the reader has something upon which to act.

ELECTRICAL WORLD

Serving a Huge and Ever-Growing Market

A McGraw-Hill Publication, 330 W. 42nd St., N.Y.C.

No. 4 of a series of factual messages designed to demonstrate that GOOD ADVERTISING *in a leading business publication will invariably produce worth-while sales results*

MANUFACTURING - MARKETS

G.E. Turbine Record May Be Set in 1940

General Electric shops at Schenectady are the busiest in at least a dozen years and an all-time production record appears a possibility for 1940. More than 1,630,000 hp. of hydrogen-cooled turbine generators and more than 1,000,000 hp. in waterwheel-driven generators are under construction at or about to be delivered from the works. There are also some air-cooled generators under construction.

Largest of the waterwheel-driven generators under construction are four of approximately 100,000 hp. each for the Shasta power plant of the Central Valley project of the Bureau of Reclamation in California.

Next in size are four 80,000-hp. units for Bonneville. Others include two 48,000-hp. units to be added to two existing ones in the Wheeler Dam of the TVA, one 47,000-hp. single-phase generator duplicating a unit for the Safe Harbor Water Power Corp. of Baltimore, two 45,000- and one 15,000-hp. generators for the Santee Cooper power and navigation project of South Carolina, and an additional 35,600-hp. unit for Central Maine Power Co.

•

Manufacturers Paid Year-End Dividends

Harvey Hubbell, Inc., paid an extra dividend of 20 cents a share in December along with the regular quarterly dividend of 30 cents a share.

Arrow-Hart & Hegeman Electric Co. paid a Christmas bonus of a week's pay to workers employed more than six months. Others received $10. Approximately 2,000 employees benefited.

Armstrong Cork Co. paid a year-end dividend of $1 a share on the common stock, bringing total payments for 1939 to $2 a share. This compares with 75 cents distributed last year. Directors also increased to $500,000 from $400,000 the reserve set aside for continuation of hourly workers' income security plan in 1940. From it workers draw benefits when their working hours are curtailed.

Birtman Electric Co. authorized a special dividend of 50 cents on the common stock, bringing 1939 distributions to $2 a share, or $1 more than the previous year.

•

Contracts Awarded by Federal Agencies

Supply contracts were recently awarded by various Federal agencies. Electrical manufacturing companies participating in these awards follow:

General Electric Co., Navy, electric cable, $15,768; War, regulators, $15,246; War, electrical equipment, $28,612; Navy, switchgear, $29,045.

Anaconda Wire & Cable Co., Navy, electric cable, $14,776; Navy Yard, wire and cable, $34,879.

Phelps Dodge Copper Products Corp., Habirshaw Cable and Wire Division, Navy, electric cable, $15,129; Navy, electric cable, $70,776.

Okonite Co., Navy, electric cable, $14,720; War, submarine cable, $174,400.

Rockbestos Products Corp., Navy, electric cable, $15,564.

Graybar Electric Co., War, crystal unit coil set, $93,888.

Bishop Wire & Cable Corp., Navy, electric cable, $17,732.

Circle Wire & Cable Corp., Panama Canal, copper cable, $25,001.

Ajax Electrothermic Corp., War, motor-generator, $29,500.

Continental Electric Co., War, generator, $12,990.

•

Make Sales Appointments

Illinois Electric Porcelain Co., Macomb, Ill., has appointed Ernest T. Loyd, 198 Walton Street, N.W., Atlanta, Ga., as agent for the sale of its products in the entire southeastern section of the United States.

Terry Steam Turbine Co. has announced the appointment of Roger C. Jones, P.O. Box, 1,421, Hartford, Conn., as sales representative for the state of Connecticut.

Refrigerator Sales Show Seasonal Rise

Domestic sales of household electric refrigerators by sixteen companies amounted to 51,258 units in November, compared with 29,952 units in November, 1938, and 57,715 units in October by seventeen companies, according to reports received by the National Electrical Manufacturers Association. It is estimated that the figures reported include more than 90 per cent of the industry.

For the eleven months ended November 30 domestic sales totaled 1,733,630 units, compared with 1,147,217 units for the similar period of 1938.

World sales during November amounted to 60,179 units, compared with 67,674 units by seventeen companies in October and 38,039 units in November, 1938. For the eleven-month period world sales totaled 1,887,240 units, compared with 1,304,593 units for the similar period of 1938.

•

Emerson Group Appointed

Appointment of a subcommittee to seek means of persuading the Emerson Electric Manufacturing Co. not to move from St. Louis to Evansville, Ind., was announced recently following a special meeting of the executive committee of the St. Louis Chamber of Commerce. A conference was planned with W. Stuart Symington, president of Emerson Electric Manufacturing Co.

•

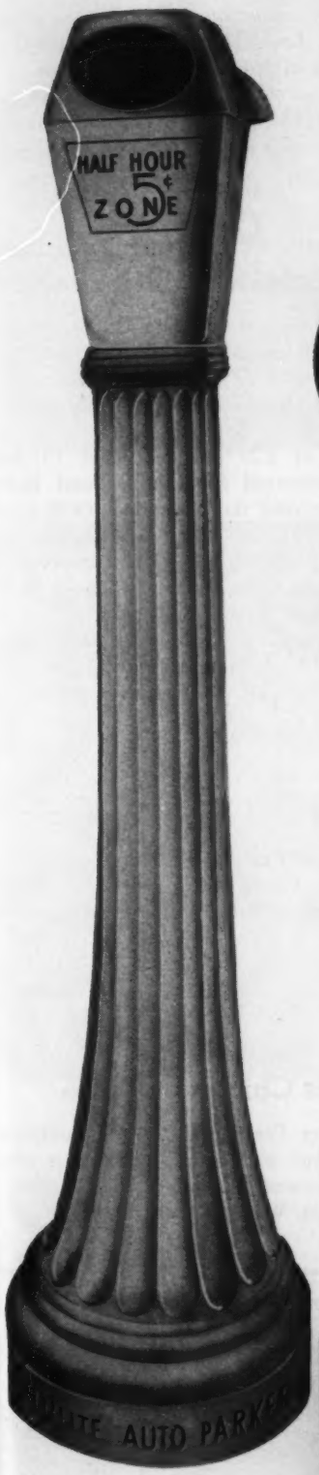
Carrier Corp. at Fair

Carrier Corporation has signed a contract for participation in the 1940 New York World's Fair, according to J. I. Lyle, president. Mr. Lyle said that the Carrier exhibit had been completely revamped on the interior in order to give the public "a better show."

MUNICIPALITIES

will welcome the

BLULITE *Electric* PARKING METER



WHAT *Electric* PARKING MEANS TO THE UTILITY:

1. Additional load
2. Installation contracts
3. Maintenance work
4. Community service

Correspondence concerning the revolutionary new BLULITE Electric Auto Parking Meter invited.

Municipalities will find in the Blulite Electric Auto Parker a new tool for the regulation of traffic in congested areas at night as well as by day.

There are no mechanical "gadgets" to get out of order, no winding, no flag, etc., etc., in the Blulite Electric Auto Parker. This means added net revenue resulting from lower maintenance and operating costs. Through more efficient regulation of night parking, BLULITE nearly doubles parking meter revenue hours, enhancing their desirability over mechanical, non-illuminated types.

Through Blulite Auto Parking Meters, utilities can derive an installation profit, additional load which otherwise would not exist, and a new opportunity to serve its community. Each parker contains two 7½ W lamps and a synchronous motor. Cable is snaked under the sidewalk without requiring expensive highway work. Expert engineering service is available to help you plan your local installation properly.

ELECTRIC AUTO PARKER CORP.

250 WEST 57th STREET NEW YORK CITY

750,000 Installations Can't Be Wrong

The supplement with Electrical World issue of May 6, 1939, lists 145 Largest Generating and Distributing Systems in the U. S. 48 of these representative Companies and many other smaller properties regularly use M. I. F. Through-bolt Guy Hooks on exclusive or preferred specification basis. Investigation pays.

Guy Hooks— Three principal types in addition to the P134 Crossarm Guy Hook. P135 rated at 13,000 lbs. on ⅝" through-bolt is widely used for rural electrification. P133 rated at 20,000 lbs. on ¾" through-bolt. P132 rated at 40,000 lbs. on 1" through-bolt. Make up guy loops on the ground and save time of the whole gang. Prices as low as 15c each in quantity.

Eye Nuts and Anchor Rods— Thimbleless Eye Nuts for ⅝" bolt as low as 12c each in quantity. Larger sizes for ¾" and 1" bolts. Double Eye Nuts and various types of Bolt Eyes also available. Also furnished assembled and galvanized as unit on special steel rods of any desired length, rated at 80,000 lbs. per sq. in. at correspondingly attractive prices. These Eyes, used with standard stocks of through-bolts, round out simple specifications for pole-to-pole guys, etc., other than anchor type served by the Guy Hooks.

Curved Washers— Full line of Curved Ribbed Malleable Washers using the metal to better advantage than plate washers of uniform thickness, minimizing the pole-splitting stresses of through-bolt guying of any type, and strictly competitive as to price.

Send for Samples and Descriptive Literature.

Misc. M. I. F. Pole Hardware Specialties—*Williams Pole Mounts—Pole Stubbing Clamps—Aerial Cable Messenger Clamps and Insulated Hangers—Malleable Secondary Racks and Clevises—Malleable Crossarm Gains—Screw Anchors—Transformer Gain Plates and Kick Arms, etc.*

MALLEABLE IRON FITTINGS COMPANY

Pole Hardware Dept. [Factory and New England Sales Office] Branford, Connecticut

New York Sales Office: Thirty Church Street

Canadian Mfg. Distributor: LINE & CABLE ACCESSORIES, Ltd., Toronto

AMELECTRIC

WIRES AND CABLES

POWER CABLE
PAPER INSULATED
VARNISHED CAMBRIC INSULATED

TELEPHONE CABLE
BARE COPPER WIRE AND CABLE
WEATHERPROOF WIRE AND CABLE
MAGNET WIRE
TROLLEY WIRE

"QUALITY ABOVE SPECIFICATIONS"

KENNECOTT WIRE AND CABLE COMPANY

SUBSIDIARY OF KENNECOTT COPPER CORPORATION

PHILLIPSDALE, RHODE ISLAND

New York, 10 East 40th St. - Chicago, 140 South Dearborn St. - Cincinnati, Traction Bldg.

Air Conditioning Orders Continue Rise in October

Orders for air conditioning systems and equipment booked during October by 267 manufacturers were valued at $9,171,828, as against $8,813,714 for September, according to the Department of Commerce. For the first ten months these bookings totaled $65,510,040.

Comparative figures for last year are not available. On the basis of the previously maintained series, however, orders booked during the first ten months of this year by 125 manufacturers were valued at $47,460,541, as against $34,099,784 in the corresponding period a year ago.

•

November Vacuum Cleaner Sales Establish Record

Vacuum cleaner sales in November were the highest in history for the month, totaling 141,066 and topping the previous November high of 139,843, reported in 1935. They also were an increase of 2.29 per cent over 137,901 sales reported for October and 18.04 per cent over the November, 1938, total of 119,506, according to industry figures reported by C. G. Frantz, executive secretary of the Vacuum Cleaner Manufacturers' Association.

For the eleven months sales total 1,279,218, an increase of 8.43 per cent over 1,179,720 in the same period of 1938.

•

City Plant Lets Contract

City of Carlyle, Ill., has awarded a contract for a 1,000-kw. turbo-generator and condenser to the Westinghouse Electric & Manufacturing Co., at $47,695. The new unit is to be installed in the municipal light and power plant.

•

Moves Chicago Offices

Proctor Electric Co. of Philadelphia has moved its Chicago office to a new and improved location in the Merchandise Mart. W. Trittipo is in charge.

New York Metal Prices

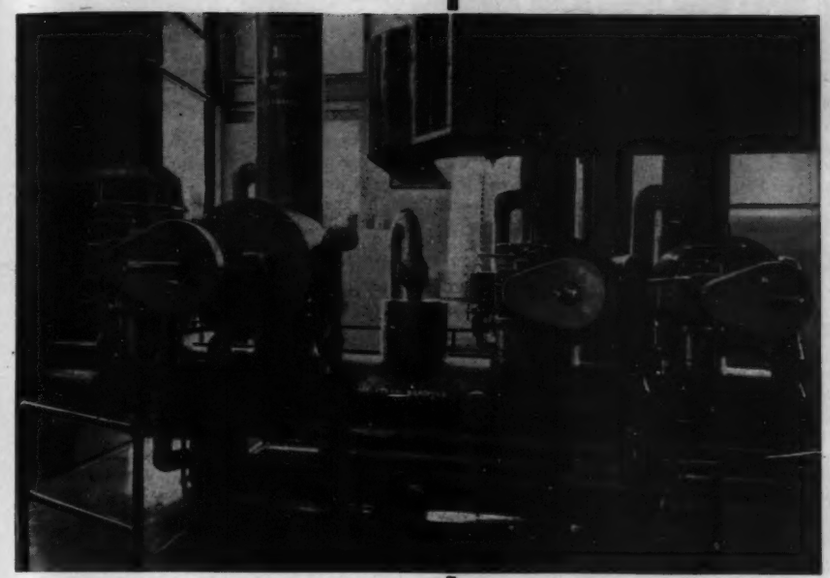
	Jan. 9, '40 Cents per Pound	Jan. 3, '40 Cents per Pound
Copper, electrolytic	12.50*	12.50*
Lead, A. S. & R. price	5.50	5.50
Antimony	14.00	14.00
Nickel, ingot	35.00	35.00
Zinc, Spot	6.14	6.14
Tin, Straits	47.75	48.75
Aluminum, 99 per cent	20.00	20.00

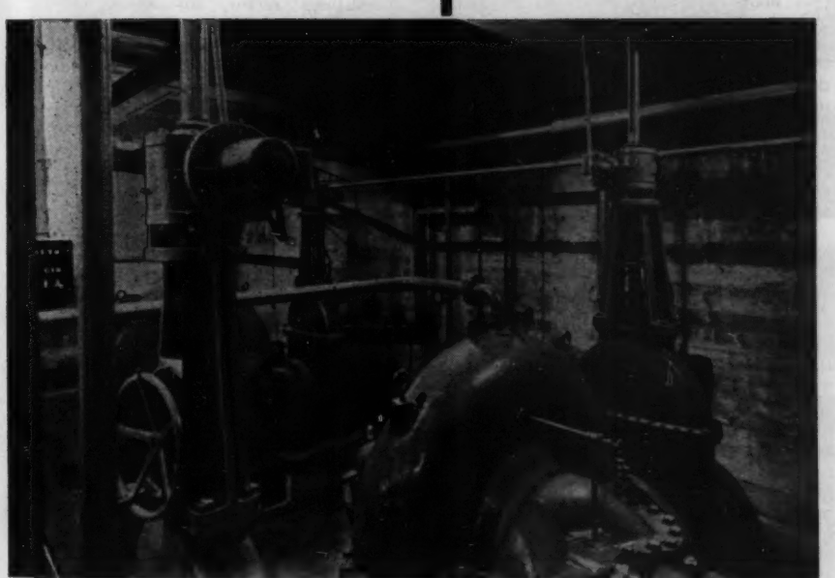
*Delivered Connecticut Valley.

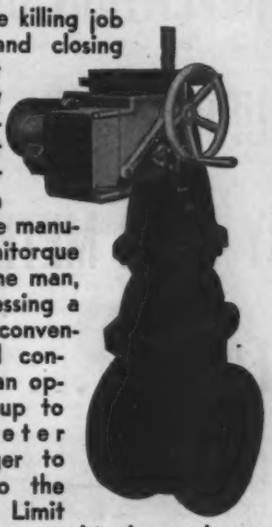
Save Man-hours by saving Manpower

with . . . .

Philadelphia LIMITORQUE VALVE CONTROLS



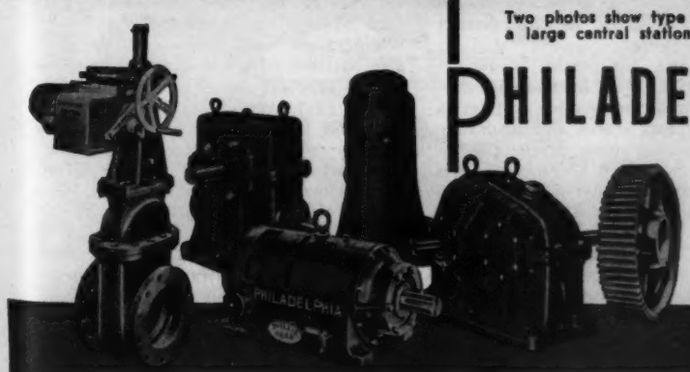




doing the time killing job of opening and closing large and out of the way valves. Limitorque does it faster, easier and safer than it can be done manually. With Limitorque Control one man, simply by pressing a button on a conveniently located control station can operate valves up to 72" in diameter without danger to himself or to the valve parts. Limit switches, incorporated in the mechanism, provide sure protection to the parts by automatically cutting off power when an obstacle is met during the valve movement.

Power Plants, Central Stations, Hydro-Electric Plants have many uses for Limitorque's time and labor saving advantages . . . write and let us tell you how they can help cut your costs. Limitorque is readily adaptable to present equipment.

Two photos show type GS Limitorques fitted to 8", 12", and 36" valves in a large central station in the Southwest.

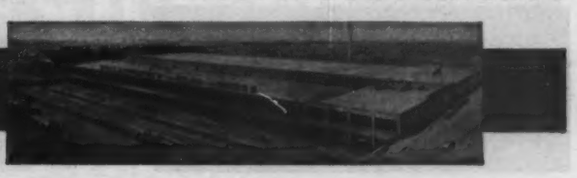


PHILADELPHIA *Limitorque*

PHILADELPHIA GEAR WORKS

Erie Avenue and G Street, Philadelphia, Pa.

NEW YORK • PITTSBURGH • CHICAGO



INDUSTRIAL GEARS • SPEED REDUCERS • MOTOREDUCERS • LIMITORQUE CONTROL

STATISTICS PROVE MANY THOUSANDS OF DOLLARS SAVED ANNUALLY IN THE PREVENTION OF CURRENT DIVERSION BY STAR METER SEALS . . . . . .

Here is one of the simplest, most inexpensive and yet highly effective means of stopping the power thief. STAR METER SEAL is a porcelain cap — a permanent seal that fits all CS type meters and must be destroyed or mutilated beyond further use to be removed.

Send for sample and complete information as to application and prices

STAR PORCELAIN COMPANY
51 MUIRHEAD AVE., TRENTON, N. J.

Field Reports on Business

Although some manufacturers report a seasonal decline in business, the electrical industry shows a good volume of incoming orders. The number of inquiries has shown an increase of late, indicating utilities are soon to put construction budgets into operation. Orders are diversified, but encourage an optimistic view.

NEW YORK

The severe cold weather which has swept the country has slowed up outside construction to some extent. Retail buying has shown some tapering off. The slowing up which has been expected is beginning to show. However, opinion is that it will not be severe. Utilities are studying the SEC decision in the Consumers Power financing as to what effect it will have on plans to raise additional capital to meet construction budgets.

Showings of the 1940 major electric appliance lines to dealers were completed this week, with General Electric, Kelvinator and Frigidaire holding meetings. Westinghouse had its preview in New York last week. Improvements have been made mechanically and in appearance which should stimulate sales in the replacement market as well as in new sales.

Appliance manufacturers are optimistic over the outlook for sales this year, with estimates of a 15 per cent rise. Roaster sales, showing a 20 per cent gain in 1939 over 1938, are to be pushed even stronger this year.

Electrical manufacturers report production floors well filled with orders and a good backlog to carry schedules ahead for some months. The government's defense budget, utility new construction and industrial expansion are expected to give manufacturers added business. Earnings have shown improvement, which makes for a better feeling throughout the industry.

The Pittsburgh area reported a further decline in activity, reflecting the letdown after holiday trade.

NEW ENGLAND

Electric equipment sales for the past week continued strong despite the holiday interval. Small motors aggregating more than 1,500 hp. were placed among metal working and machine construction industries. Orders for a large volume of control apparatus together with wire, cable and hardware for plant expansions were reported by one distributor, who notes that inquiries are being received in surprisingly strong trend. During the past fortnight more than 600 hp. in motors were booked for Rhode Island textile plants according to one manufacturer; small safety switch sales of a nationally known company almost doubled in this district during the past year.

Electric cooking equipment is receiving much attention. New institutions, dormitories and employee service cafeterias for large department stores and insurance companies are among many projects looming into view where new electric cooking equipment is being considered. One source estimates that more than $25,000 will be spent soon in this district for apparatus.

More than $7,500 is involved in labor and new lighting fixtures for a Springfield, Mass., school; floodlighting and directional lighting for new airfield at Quonset, R. I., and Chicopee, Mass., are being planned. Brockton, Mass., has installed 51 new centrally controlled light stations for traffic routing and reports from various points in this area point to a widespread interest in special holiday lighting installed during the past fortnight.

Westinghouse officials visualize an encouraging trend in sales of appliances for 1940. The East Springfield plant of this company is preparing for estimated increases of 15 per cent for refrigerators and 20 per cent for ranges. The G.E. Lynn works are on a 40-hour basis, as against 32 hours per week a year ago.

PACIFIC COAST

Fortified by an excellent final quarter of 1939, the electrical industry generally is predicting good business in all branches during 1940, estimates ranging from 10 to 20 per cent increase. Government construction will reflect recent Congressional appropriations covering many projects. PWA and REA projects are practically completed except for scattered seasonal holdings, but the privately owned companies have programmed extensive additions to their systems in sparsely settled counties.

Bonneville system purchases are large and varied, recent bids and awards having covered red cedar poles for the Yakima-Ellensburg sector, insulators, crossarms and 69-kv. and 115-kv. disconnect switches for the substations, low bid on the switches being $63,802 by Railway & Industrial Engineering Co.; 230-kv. switch structures and 10,000-kva. transformers and bus insulators. Included in new industrial construction is complete 1,500-kva. electrical equipment for a cement plant at Medford, Ore.

CHICAGO

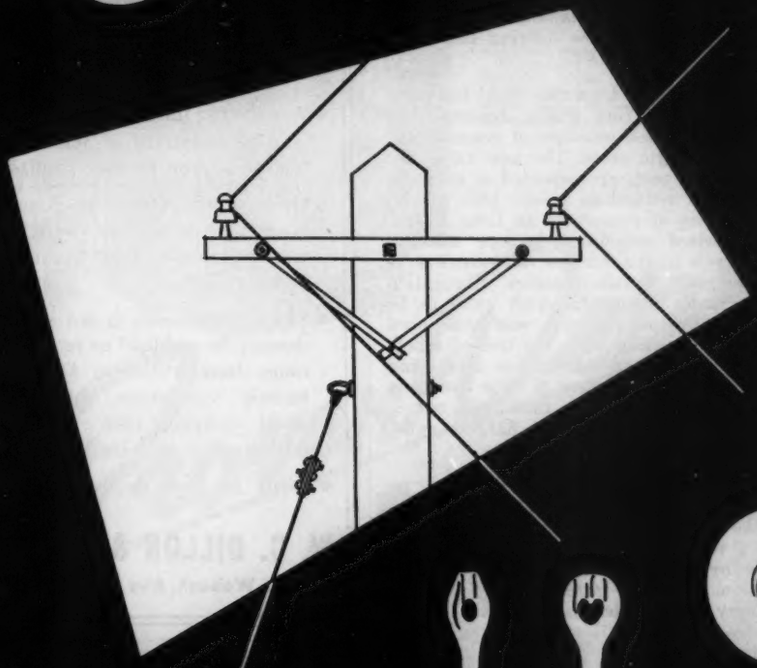
Inquiry among the various elements of the electrical industry reveals an optimistic attitude prevailing over the outlook for the first half of the year, at least. Manufacturers report a fairly steady flow of new orders still being received, which, coupled with the present backlog, will maintain activity at a relatively high level for some time. Electrical contractors are more active than at any time for a number of years.

Utility construction budgets have been further expanded to meet the steadily increasing power consumption rate. Electrical merchandise proved an important factor in one of the most successful holiday trade seasons on record. Sales of electrical refrigerators and ranges by the Frigidaire division of the General Motors Corp. in this area during 1939 showed a gain of 35 per cent over the previous year.

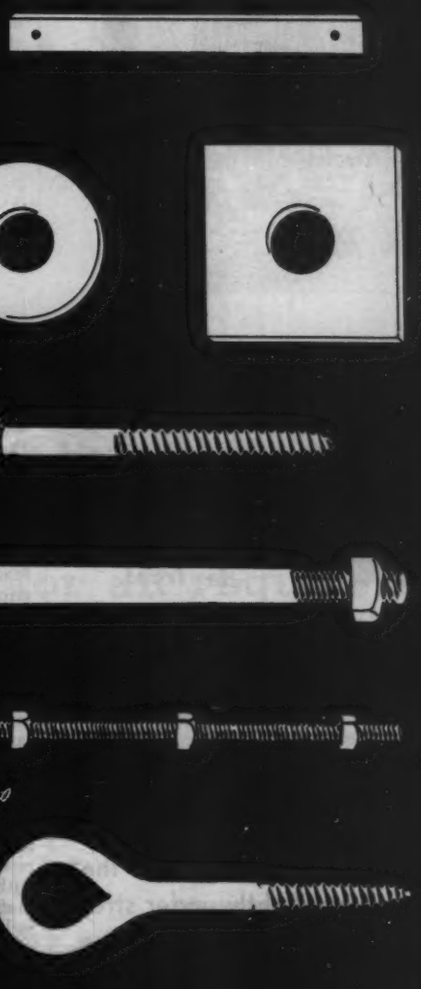
Edison G. E. Appliance Co. will spend approximately $50,000 on expansion of manufacturing facilities. Another large appliance manufacturer is installing 47 new motors totaling 287 hp.

Industrial operations continue to move ahead at an encouraging pace. Acme Steel Co. awarded a contract for construction of a cold reduction mill at a cost of $1,500,000, including machinery and equipment. The city electrical department has requested bids on 6,000 lb. No. 9 A.W.G. magnet wire, 150,000 ft. of two-conductor No. 17 telephone wire and 1,000 ornamental cast-iron lamp posts.

U·S· POLE LINE HARDWARE *IS* DEPENDABLE



Made from the best quality steel... manufactured with consummate skill... hot galvanized for weather protection... outstanding in the field of service



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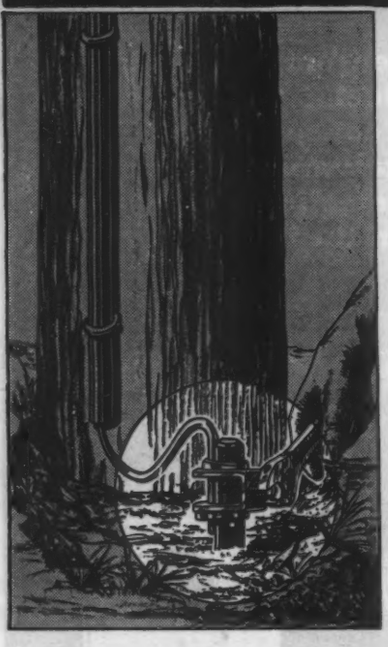

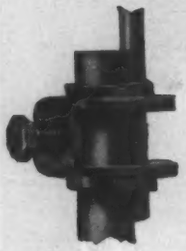

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Recent Rate Changes

CENTRAL HUDSON GAS & ELECTRIC CORP. has filed a general revision of residential and commercial electric rates with the New York Public Service Commission which is estimated to save consumers of the company $107,283 annually. The commission permitted the company to make the reduced rates effective January 1. The reductions are estimated to save residential consumers $28,000 a year and to reduce the bills of commercial and industrial users $79,759 annually, while power and sign and window lighting consumers will save about $5,615.

LONG ISLAND LIGHTING CO. has filed with the New York Public Service Commission a revised schedule of general commercial electric rates. The new rates, the commission said, are expected to result in substantial reductions in the bills of certain classes of consumers on Long Island. The revised schedules became effective January 6 in the various rate districts in Nassau and Suffolk counties. Abrogation of an order fixing temporary rates to be charged by the company was announced by the commission when the revised schedules were filed, the abrogation also being effective as of January 6. The company estimates that the new rates will reduce the bills of consumers by $21,350 annually.

DURHAM PUBLIC SERVICE CO. has reduced its electric rates, saving customers in the city of Durham approximately $71,000 a year, according to an announcement made by the North Carolina Utilities Commission. The new rates became effective January 1. Included is a special charge of 1½ cents a kilowatt-hour for water heating.

MASSACHUSETTS DEPARTMENT OF PUBLIC UTILITIES has accepted a rate reduction effective January 1, 1940, by the Quincy Electric Light & Power Co. calling for cuts aggregating $63,700 per year. Residential and commercial customers will benefit and the city will save $9,500 annually in lower street lighting and municipal service costs. In 1937 reductions aggregating $100,505 went into effect. There are 23,645 customers. An interesting feature of the case, which the board declined to continue on its own motion at present in order to try out the new rates, is the favorable physical situation of the property with respect to the Edgar station of the Boston Edison Co., from which it purchases energy for resale. The territory is also compact and the company's largest customer is the Fore River yard of Bethlehem Shipbuilding Corporation. On account of this, it was averred in the hearings that the company's business was sufficiently assured and profitable to warrant further reductions than those proposed. The commission was impressed with this point and was inclined to believe that even if the shipyard business should fall off, in the event of cessation of hostilities abroad, the utility's business would hold up as well as it had during the depression years. Despite this, the board expressed itself as unwilling to press down upon the company for the time being, noting the requirements involved in a fair return as expressed in former United States Supreme Court findings, which include revenue necessary to attract capital in addition to meeting all operating and fixed costs. At any time, the commission pointed out, the board can further investigate rates, and suspension of the proposed 1940 tariffs would postpone the

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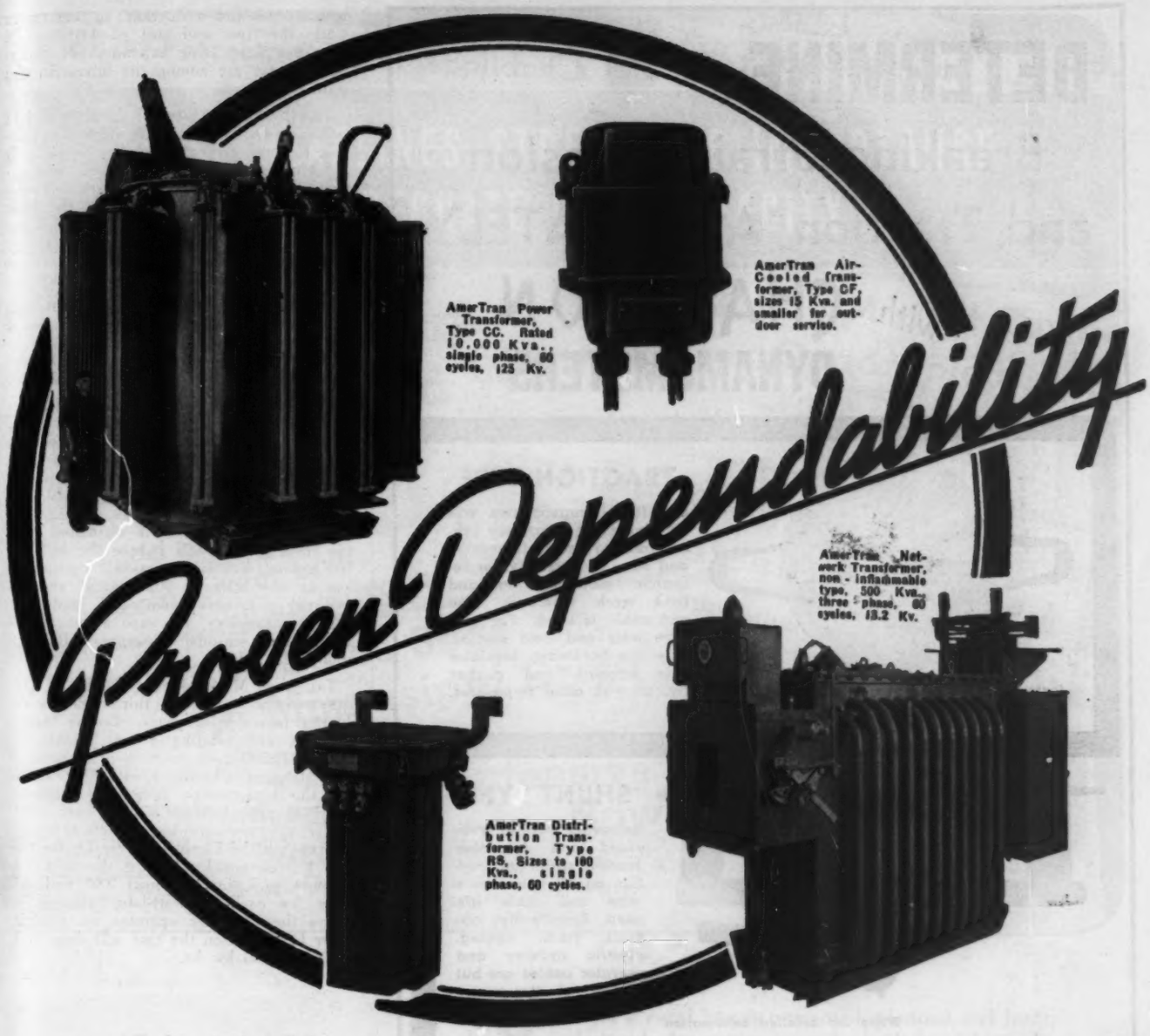
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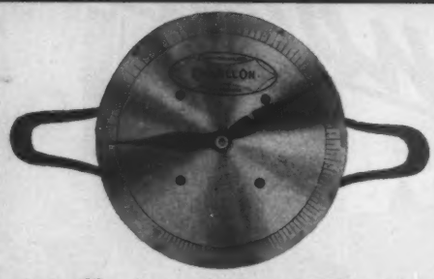

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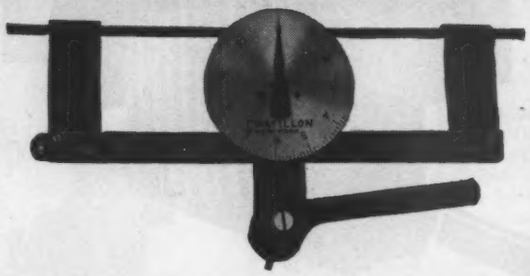

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benefits of the reduction to customers while the time and cost of a continued rate case were being expended. The company's rates are among the lowest in the state.

PENNSYLVANIA POWER & LIGHT Co. has established a new schedule of rates applicable to small power users. The new schedule applies to small power and commercial users throughout the entire territory served by the company. Under the new schedule a rate of 5 cents per kilowatt-hour for the first 40 kw.-hr. block has been substituted for the present rate of 5½ cents for the first block of 50 kw.-hr.

WESTERVILLE, OHIO, CITY COUNCIL has approved an ordinance reducing rates of the municipal light plant approximately 14 per cent, effective on bills due February 1. The reduction will amount to $7,500.

CAZENOVIA ELECTRIC Co. has filed a revision of electric rates with the New York Public Service Commission which reduces the annual and seasonal residential rates by amounts estimated to save consumers about $1,830 annually. The commission permitted the revised rates to become effective January 1. It is estimated that the revised rates will reduce the bills of 168 annual and eight seasonal customers, leaving the bills of 902 annual and 84 seasonal customers unchanged, and that annual consumers will save about $1,805 a year and seasonal customers will save about $25 a year.

TAUNTON, MASS., MUNICIPAL LIGHT DEPARTMENT announces the thirteenth rate reduction in seventeen years, effective March 1, 1940, and totaling about $40,000, of which $13,500 goes to residential customers. Manager Chester F. Buckley states that the department's increase in business for 1939 approximates $50,000 over 1938. Under the new residential schedule the top rate will be 5 cents per kw.-hr. for the first 15, 3.5 per kw.-hr. for the next 75, 2 cents each for the next 150 and 1.5 cents for each kilowatt-hour above 250 unless the customer operates an electric water heater, when the rate will drop to 1 cent after 250 kw.-hr.

Municipal Plants

FAYETTEVILLE, ARK.—City officials have planned to notify Southwestern Gas & Electric Co. of the city's intention to buy the company's light, heat and power plant and distribution system and operate it as a municipal plant. State law required that the city give 90 days' notice and that the state Public Utilities Commission fix a purchase price if one cannot be agreed upon.

HARRISON, ARK.—Unable to reach an agreement with the Arkansas Power & Light Co. on a price for the company's plant and system in this city, which the city proposes to buy, City Council has instructed Mayor L. C. Holt to request the state Public Utilities Commission to call a hearing to determine the price. City engineers, the W. B. Archer Engineering Co. of Kansas City, appraised the distribution system at $120,600, including severance damages and the power plant at $10,000, a total appraised value of $130,600. Of the total $47,792 is for severance damages, the remainder being the physical value of the property, as appraised by the city's engineers. Frank M. Wilkes, general manager of the company, told the council in September that his company would ask from $450,000 to $500,000 for the prop-

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Kellogg says industry is faced with making investments in rural lines successful and electricity useful to millions more citizens —
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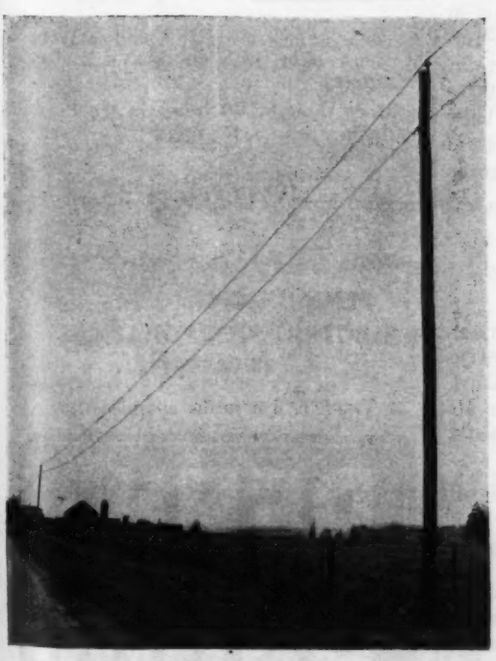

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erty, placing the actual value of the property at between $250,000 and $300,000 with severance damages of $200,000. He declared that the Harrison unit is the heart or "core of the Ozarks" division of the company and that loss of it would cripple the entire division.

ADAMS, WIS.—Because the state Supreme Court in the Superior utility acquisition case recently ruled that the state Public Service Commission is without authority to reopen a closed acquisition case, the commission has dismissed a petition filed by attorney for the city of Adams in its case seeking to acquire a light plant. The petition asked a rehearing on the commission's order of November 14 dismissing a petition for reopening filed on behalf of the city. The reopening had been asked to permit taking further evidence on whether a four-month period for completion of acquisition should be extended. Wisconsin Power & Light Co. serves the city.

•

German Energy Production Seen at All-Time Record

On the basis of returns for the 122 largest power stations, output of electrical energy during the first seven months of 1939 in Germany was 16 per cent above 1938, according to "World Electrical Markets," publication of the U. S. Department of Commerce.

Later figures are not available, the bulletin states, and most probably will not be released until after the war, since the issuance of power statistics has been suspended since the beginning of the present war. It is estimated, however, that the power output for the year will be about 63,000,000,000 kw.-hr., more than double the pre-depression peak production in 1929 of 30,700,000,000 kw.-hr. and about half the estimated output in 1939 for the United States, 123,000,000,000 kw.-hr. Germany has been second only to the U. S. in electric power production. Output figures refer to the Old Reich only.

•

Winter Fan Sales Drive

Georgia Power Co. is going after the winter fan business. The idea is to demonstrate that a fan placed above the source of heat will circulate the air throughout the room, making it more comfortable and healthful.

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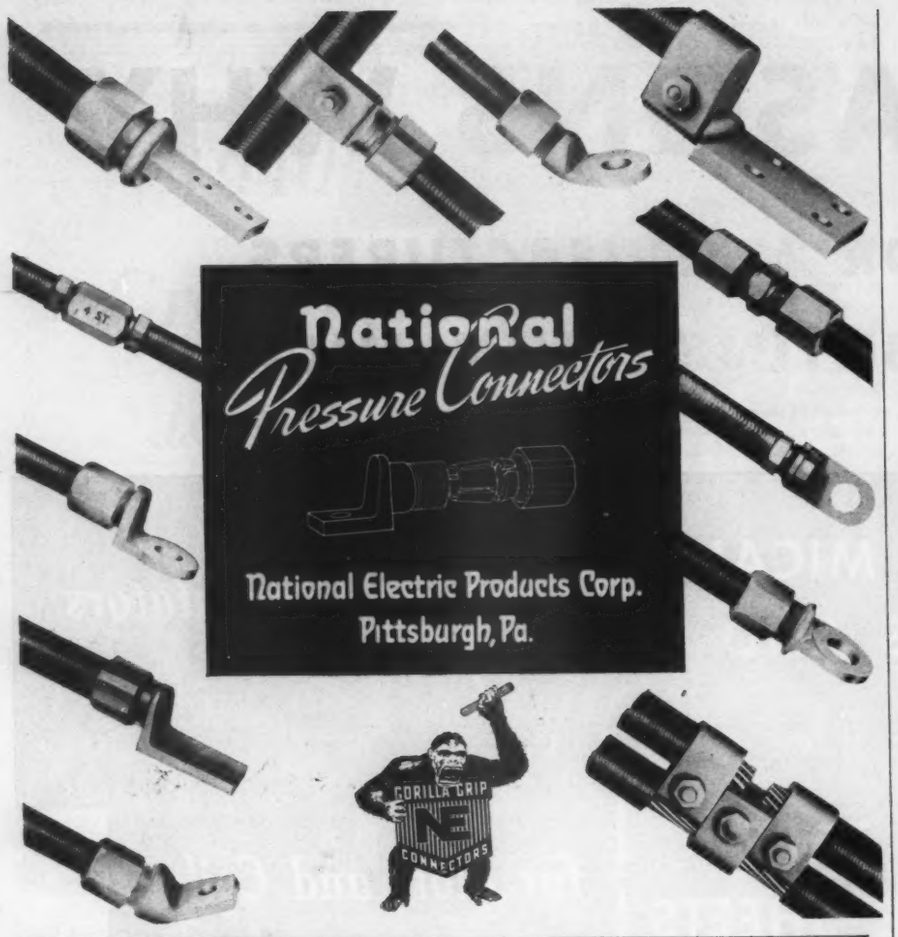

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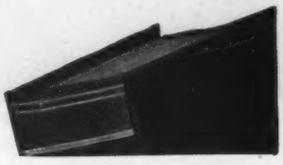

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Sales Opportunities

SAN ANTONIO, TEX.—San Antonio Public Service Co. is arranging fund of about $500,000 for extensions and improvements in transmission and distributing lines in 1940, a considerable part of appropriation to be used for primary and secondary lines for expansion in rural electric system, including outdoor power substations and service facilities. Plans are under way for addition to Comal power substation, vicinity of New Braunfels, Tex., with installation of transformers, switchgear and accessory equipment for increased capacity.

GRAND FORKS, N. D.—Nodak Rural Electric Co-operative, Inc., E. A. Walters, secretary, will have plans drawn at once for new electric generating plant on local site, using diesel engine-generator units and accessories. Cost estimated about $225,000, and financing in that amount has been arranged. Bids will be asked in near future. New station will be used for power supply for rural electric system to be built by organization, totaling close to 1000 miles of lines. Ellerbe & Company, First National Bank Building, St. Paul, Minn., are consulting engineers for power plant.

BONNEVILLE, ORE.—United States Engineer Office, Bonneville, receives bids until January 30 for constructing and erecting new 230-kv. switch structure on roof of Bonneville power station (Circular 106).

GEORGETOWN, S. C.—Southern Kraft Corp., 220 East Forty-second Street, New York, N. Y., plans installation of motors and controls, regulators, conveyors and other equipment in new additions to branch kraft container board and paper mills at Georgetown, and Springhill, La., to increase capacity by 330 tons per day at both plants. Work will begin at once and is scheduled for completion next spring. Entire project will cost close to $750,000.

HOUSTON, TEX.—Houston Lighting & Power Co. has plans under way for large power substation on site at end of Blodgett Street, where 10-acre tract of land has been selected. Construction is scheduled to be carried out in 1940.

LADYSMITH, WIS.—Peavey Paper Products Co., Ladysmith, operating local hydroelectric power plant of Lake Superior District Power Company, Ashland, Wis., under lease, plans expansion and improvements in station, including installation of new turbo-generating unit and auxiliary equipment. Cost estimated about $150,000. Permission has been secured. Proposed to begin work at early date.

PHILADELPHIA, PA.—Sun Oil Co., 1608 Walnut Street, plans installation of motors and controls, electric-operated pumping and other machinery, regulators, conveyors and other equipment in connection with expansion and improvements in oil refining plant at Marcus Hook, near Philadelphia. Work will include a complete new refinery unit in addition to modernization of existing plant, with cost estimated close to $6,500.000. Project will be carried out during 1940.

MINEOLA, LONG ISLAND, N. Y.—Long Island Lighting Co., Mineola, is arranging appropriation of about $3,000,000 for expansion and improvements in service facilities during 1940, a considerable part of fund to be used for construction of new transmission and distributing lines, power substations and other line work.

TOLEDO, OHIO—Water Department, 561 Erie Street, receives bids until February

28 for two large electric-operated pumping stations for Lake Erie municipal water supply project, comprising a high-pressure plant at Collins Park, estimated to cost about $800,000, and low-pressure station near intake, vicinity of Reno Beach, to cost approximately $600,000. George N. Schoonmaker, 525 Erie Street, is city manager.

ABBEVILLE, S. C.—City Council receives bids until January 19 for construction of 44-kv. transmission line from municipal hydroelectric power plant on Rocky River to city limits, about 17 miles, to be used for power supply for municipality. Also, at same time, for two power substations, 1500 and 1000-kv. capacity, respectively, to be located in city. Wiedeman & Singleton, Candler Building, Atlanta, Ga., are consulting engineers.

FARGO, N. D.—Northern States Power Co., Minneapolis, Minn., plans extensions and improvements in power plant, transmission and distributing lines at Fargo, including modernization and betterments in street-lighting system. Cost estimated about $90,000. Appropriation in that amount has been authorized.

SAN AUGUSTINE, TEX.—City Council will take bids before close of January for extensions and improvements in municipal electric power plant, including installation of additional equipment. H. B. Gieb & Co., Mercantile Building, Dallas, Tex., are consulting engineers.

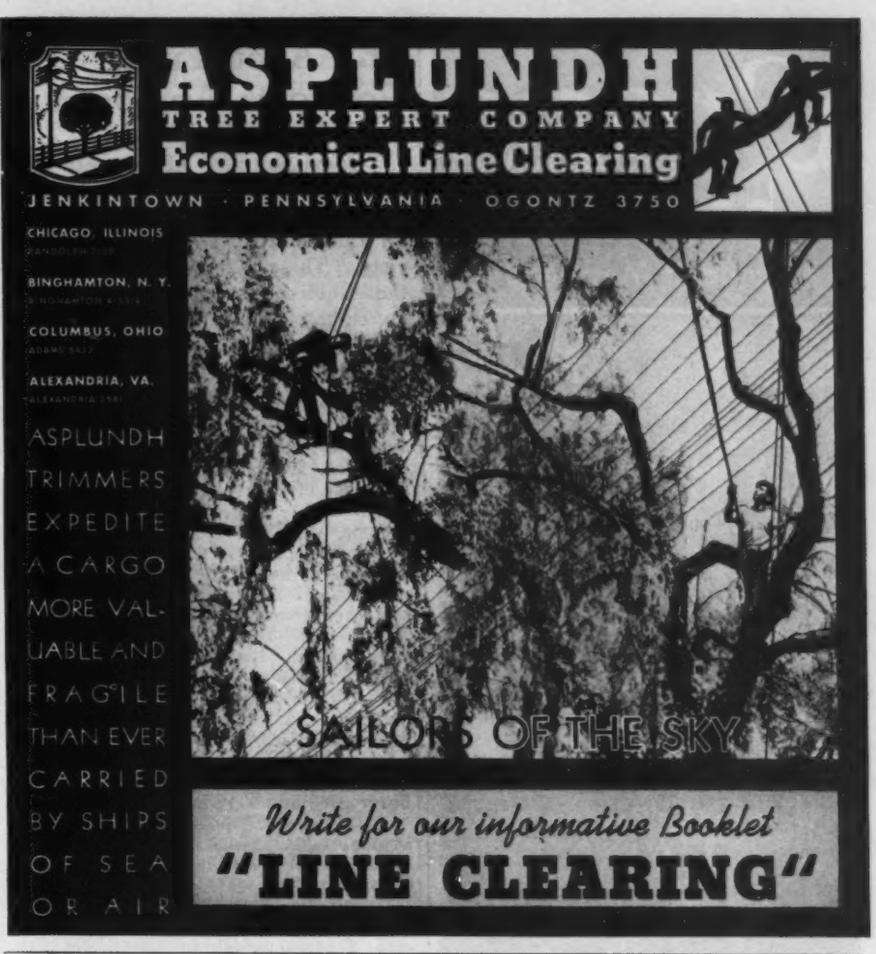
BATESVILLE, ARK.—Arkansas Power & Light Co. has plans maturing for new 110,000-volt transmission line from Batesville through White Valley district, to Harrison, Ark., where connection will be made with system of Empire District Electric Co. New line will be about 70 miles long and is estimated to cost close to $500,000, with switching station and terminal facilities. This is part of 1940 construction program of company.

WILSON, WIS.—Wisconsin Oil Refining Co., Inc., Security National Bank Building, Sheboygan, Wis. (temporary office), recently organized by D. E. Foster, Room 301, 225 East Michigan Street, Milwaukee, Wis., and associates, plans installation of motors and controls, transformers and accessories, conveyors, electric pumping and other machinery in new oil refining plant on 75-acre tract of land near Wilson, Sheboygan County, fronting on Lake Michigan, where options have been taken to purchase land. It will be located in vicinity of Edgewater generating station of Wisconsin Power & Light Co., and it is understood that power requirements will be secured from this source. Project is scheduled to be carried out in 1940. Cost estimated close to $700,000.

KEWANEE, ILL.—Kewanee Public Service Co. plans primary and secondary lines for rural electrification in parts of Henry and Bureau Counties, totaling close to 30 miles, with service facilities. Proposed to begin work at early date.

PORTLAND, ORE.—Department of Interior, Bonneville Project, Portland, receives bids until January 19 for 753 red cedar poles for 115-kv. transmission line of Bonneville system from Yakima to Ellensburg, Wash.

SEYMOUR, TEX.—City Council will complete plans and surveys soon for primary and secondary lines in parts of Knox, Baylor and Haskell Counties for rural electrification system, totaling close to 150 miles, with outdoor power substation and service facilities. Also will build generating station at Seymour for power supply. Entire project will cost approximately $200,000.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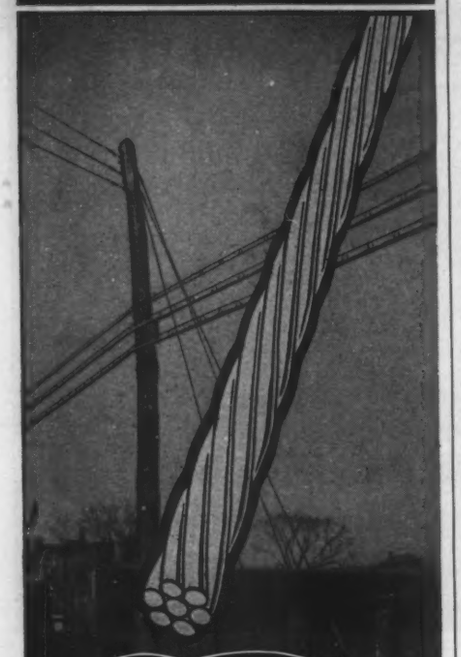

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REA Allots Funds; Contracts Approved

Toward the close of the year 1939 the Rural Electrification Administration made allotments totaling $663,000 for rural electrification systems in five states. These allotments provide for the establishment of two projects and the enlargement of four others in these states.

Details of the allotments are as follows:

FLORIDA—Central Florida Electric Co-operative Assn., Chiefland, John L. Horne, president, $96,000 to build 116 miles of line, 345 members in Levy and Gilchrist counties.

INDIANA — Jackson County REMC, Brownstown, Edward E. Combs, Jr., supt., $100,000 to build 118 miles of line, 352 members in Brown, Scott, Jennings and Lawrence counties.

LOUISIANA—Dixie Electric Membership Corp., Baton Rouge, E. B. Thompson, supt., $134,000 to build 170 miles of line, 565 members in St. Helena, East Feliciana, Feliciana and East Baton Rouge Parishes. Beauregard Electric Co-op., Inc., DeRidder, G. F. Hennigan, president, $106,000 to build 115 miles of line, 432 members in Beauregard and Vernon counties.

MARYLAND—Choptank Co-operative, Inc., Denton, C. A. Sennett, supt., $43,000 to build 50 miles of line, 126 members in Caroline and Queen Annes Counties.

MISSISSIPPI—East Mississippi Electric Power Assn., Meridian, Grady W. Smith, supt., $184,000, which, in conjunction with a PWA grant will be used to construct 390 miles of line, 1,500 members in Kemper, Winston, Clarke, Lauderdale, Wayne and Newton counties.

Earlier in December REA allotted $648,000 for rural electrification systems in Mississippi. The Four-County Electric Power Assn., Columbus, Louis Wise, supt., was allotted $279,000 to acquire and build 135 miles of line to serve 1,614 members in Chickasaw County and the Natchez Trace Electric Power Assn., Calhoun City, Ashton Toomer, president, was allotted $369,000 to acquire and build 188 miles of line to serve 2,254 members in Chickasaw, Webster and Calhoun counties.

Among the construction contracts approved between October 25 and December 6 were the following:

ARKANSAS—Ouachita Rural Electric Co-op. Corp., Camden, Ark., W. T. Slaughter, supt., and Ray W. Chanaberry, Inc., Louisville, Ky., contract to Ziegler Construction Co., Nashville, Tenn., for building entire project, 136 miles of line, 317 members; bid $71,713.

GEORGIA—Oconee Electric Membership Corp., Dudley, George C. Ingram, supt., and J. B. McCrary Engineering Corp., Atlanta, engineer, contract to the Miller Baxter Co., Indianapolis, Ind., for building entire project, 225 miles of line, 708 members; bid $129,077.

ILLINOIS—Adams Electric Co-op., Quincy, Clate Cox, supt., and George D. Simpson, Quincy, Ill., engineer, contract to Monroe Electric Co., Chicago, for building another section of project, 154 miles of line, 287 members; bid $109,219.

INDIANA—White County Rural Electric Membership Corp., Monticello, E. R. Ulerich, supt., and Lennox and Matthews, Indianapolis, Ind., engineer, contract to Palmer Construction Co., Reedsburg, Wis.,

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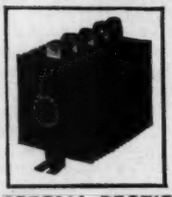

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for building entire project, 460 miles of line, 1,398 members; bid $333,839.

IOWA—T.I.P. Rural Electric Co-op., Brooklyn, Irvin L. Nervig, supt., and K. R. Brown, Des Moines, engineer, contract to the Eberhard Construction Co., Guttenburg, Iowa, for building another section of project, 251 miles of line, 497 members; bid $154,584.

KANSAS—Brown-Atchison Electric Co-op. Assn., Inc., Horton, Edward E. Dorssom, supt., and H. H. Henningson, Omaha, Nebraska, engineer, contract to Inland Construction Co., Omaha, Neb., for building another section of project, 90 miles of line, 120 members; bid $53,249.

KENTUCKY—Taylor County Rural Electric Co-operative Corp., Campbellsville, Ferrill Greagory, supt., and P. M. Sullivan, Gallatin, Tenn., engineer, contract to W. A. Smith, Louisville, for building another section of project, 36 miles of line, 88 members; bid $23,839.

MINNESOTA—Wright-Hennepin Co-operative Electric Assn., Maple Lake, Edward R. Slebiska, supt., and H. A. Bliss, Minneapolis, Minn., engineer, contract to E. W. Wylie, St. Paul, Minn., for building another section of project, 139 miles of line, 330 members; bid $96,601.

MISSOURI—Osage Valley Electric Co-op. Assn., Butler, E. C. Westhoff, supt., and Black & Veatch, Kansas City, Mo., engineer, contract to Midland Constructors, Inc., Chicago, Ill., for building another section of project, 114 miles of line, 204 members; bid $69,797.

MONTANA—Mid-Yellowstone Electric Co-op., Inc., Hysham, John Grierson, supt., and John W. Hall, engineer, contract to D. M. Manning, Hysham, Mont., for building entire project, 69 miles of line, 235 members; bid $91,388.

NORTH CAROLINA—Davie Electric Mutual Co-op., Mocksville, N. C., J. C. Jones, supt., and B. O. Vannort, Asheboro, engineer, contract to E. C. Bridges, Heath Springs, S. C., for building another section of project, 135 miles of line, 500 members; bid $92,400.

OHIO — Guernsey-Muskingum Electric Co-op., Inc., New Concord, H. B. Smith, supt., and Putnam and Woolpert, Dayton, Ohio, engineer, contract to Paul L. Gilmore Co., Columbus, Ohio, for building another section of project, 166 miles of line, 582 members; bid $119,833.

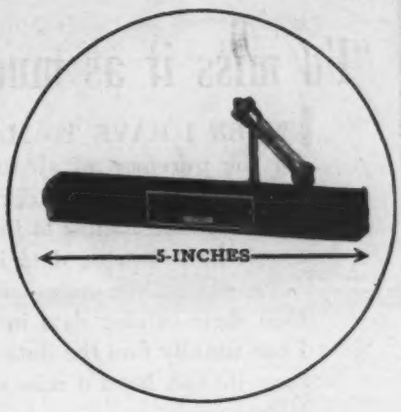
PENNSYLVANIA—Northwestern Rural Electric Co-op. Assn., Meadville, Bruce V. Hecker, supt., and Gibbs & Hill, Inc., Pa. Station, New York City, engineer, contract to Superior Construction and Engineering Corp. of Ohio for building another section of project, 138 miles of line, 522 members; bid $95,210.

SOUTH CAROLINA—Lynches River Electric Co-op., Inc., Pageland, W. S. Cauthen, supt., and J. B. McCrary Engineering Co., Atlanta, engineer, contract to the William Muirhead Construction Co., Durham, N. C., for building entire project, 267 miles of line, 702 members; bid $149,805.

TEXAS—Lower Colorado River Electric Co-op., Inc., Giddings, Leo McWilliams, supt., and Lower Colorado River Authority, engineer, contract to Ainsworth Construction Co., Dallas, for building project, 645 miles of line, 1,302 members; bid $324,920.

UTAH—Moon Lake Electric Assn., Inc., Mt. Emmons, E. E. Conklin, supt., and W. W. Flora, Cheyenne, Wyoming, engineer, contract to Homer G. Johnson, Portland, Ore., for building another section of project, 205 miles of line, 579 members; bid $150,405.

VIRGINIA—Central Virginia Electric Co-op., Lovingston, Lewis A. Bress, supt., and G. M. Ramsay, Palmyra, engineer,



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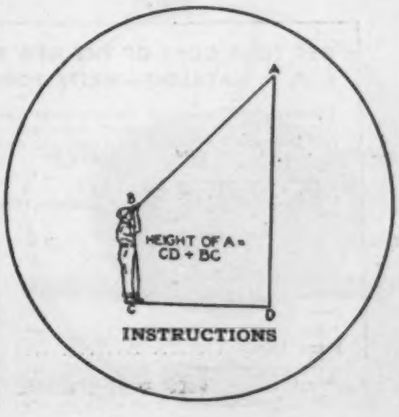

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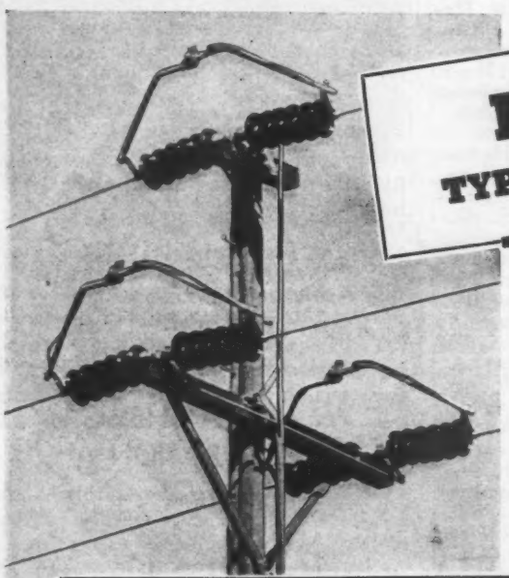

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contract to Perkins Barnes Construction Co., Blackstone, Va., for building another section of project, 59 miles of line, 164 members; bid $46,023.

VERMONT—Washington Electric Co-operative, Inc., East Montpelier, Clarke Millen, supt. and engineer, contract to Day & Zimmermann, Philadelphia, Pa., for building entire project, 55 miles of line, serve 140 members; bid $44,384.

WASHINGTON—Inland Empire Rural Electrification, Inc., Spokane, G. H. Bell, supt., and Charles W. Shouse, Spokane, engineer, contract to Homer G. Johnson, Portland, for building another section of project, 160 miles of line, 190 members; bid $120,306.

WISCONSIN—Vernon County Electric Cooperative, Westby, N. F. Leifer, manager, and N. L. Lundeen, Westby, Wis., engineer, contract to Donovan Contracting Co., St. Paul, Minn., for building another section of project, 101 miles of line, 200 members; bid $69,097.

•

Electrician Pleads Guilty to Meter Tampering Charge

A 46-year-old Herrin, Ill., electrician, Richard Griffith, recently pleaded guilty in Circuit Court, Marion, Ill., to a charge of having tampered with meters belonging to the Central Illinois Public Service Company. Property owners had paid Griffith $5 for his services in "adjusting" their meters so that they did not register the full amount of current used.

Griffith was given a year's probation on the recommendation of the state's attorney, during which time his sentence is suspended. The property owners who retained Griffith have to bear the cost of changes in their service wiring to make it as tamper-proof as possible.

•

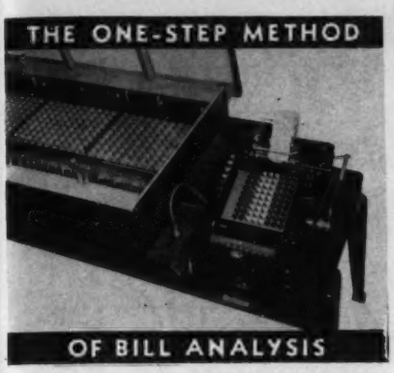
Drop Non-Automatic Irons

Beginning January 1, Proctor Electric Co., Philadelphia, discontinued the manufacture and sale of the two non-automatic irons now in their line. Some months ago the Fire Underwriters proposed to discontinue listing such flatirons during the spring of 1940. Later this proposed date was put off until the spring of 1941.

•

British Utilities Recovering

After the first impact of the war crisis, the British electricity supply industry is now returning to fairly normal conditions. Rationing of domestic consumption to 75 per cent of that in the year ended June 30, air-raid precautionary black-out measures, evacuation of population from large centers and the general business dislocation led to a sudden sharp drop in power use. Since then a steady recovery is noted.



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BOOK REVIEWS

Terrestrial Magnetism and Electricity

By J. A. Fleming. Published by McGraw-Hill Book Co., 330 West 42d Street, New York, N. Y. 703 pages, illustrated. Price, $8.

Fourteen geophysicists prepared for the National Research Council the papers which have here been collated by the director of the department of terrestrial magnetism of the Carnegie Institute of Washington. The specialties embrace earth magnetism, its measurement, magnetic prospecting, atmospheric electricity, earth currents, exploration of outer atmosphere, aurora, atmospheric electricity (this latter by B. F. J. Schonland of South African lightning fame). The papers constitute an undeniably authoritative treatise on the earth as a generator and circulator of magnetism and currents both in the earth and in its atmosphere as well as presenting the hypotheses which seek to account for the phenomena and the influences which vary them.

Probably most of practical interest to power engineers will be the Schonland chapter on thunder clouds and their electrical effects. This assembles into a unified whole the international researches which have established the atmospheric philosophies upon which the whole technique of lightning protection is founded.

This is manifestly a classical book which should be in the library of the electrical engineer who wishes to look there for escape from empiricism when he is minded to take a new basic departure for his experiments to render man-made electricity free of the ravages of atmospheric assault.

•

A History of the Growth of the Steam Engine

By Robert H. Thurston. With supplementary chapter by William N. Bernard. Published by Cornell University Press, Ithaca, N. Y. 355 pages, illustrated. Price, $3.

This printing represents a seventh edition of Thurston's masterly résumé, the last having appeared in 1907. It remains the classical history of steam power up to the original time of writing. Professor Barnard has added in this edition a chapter which covers briefly the 1870–1939 era of the high-speed engine and the turbine. Power engineers will want to add to their historical library this critical evaluation of the contributions of the engineers—Hero, Newcomer, Watt, Fitch, Fulton—to the power foundation of today's industrialized civilization.

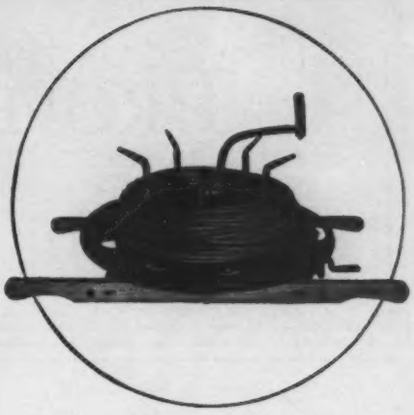
•

Die Ortsfesten Anlagen Elektrischer Bahnen

Stationary Structures of Electric Railroads.

By Karl Sachs. Published by Orell Füssli Verlag, Zurich and Leipzig, 321 pages, 430 illustrations, eight plates. Price 48 francs, 29 reichsmarks.

Beginning with a method for determining the rating of the power plant, based on train schedules and leading to a "demand-duration" chart, this book deals successively with the structures required for each stage in the flow of energy from turbine to contact conductor.



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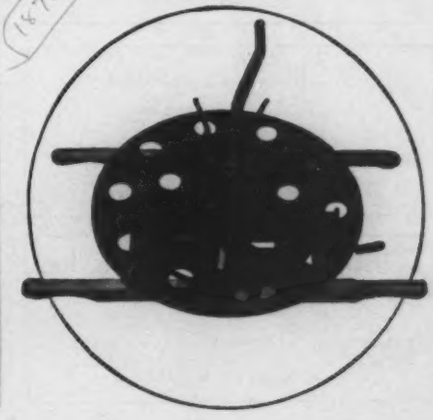

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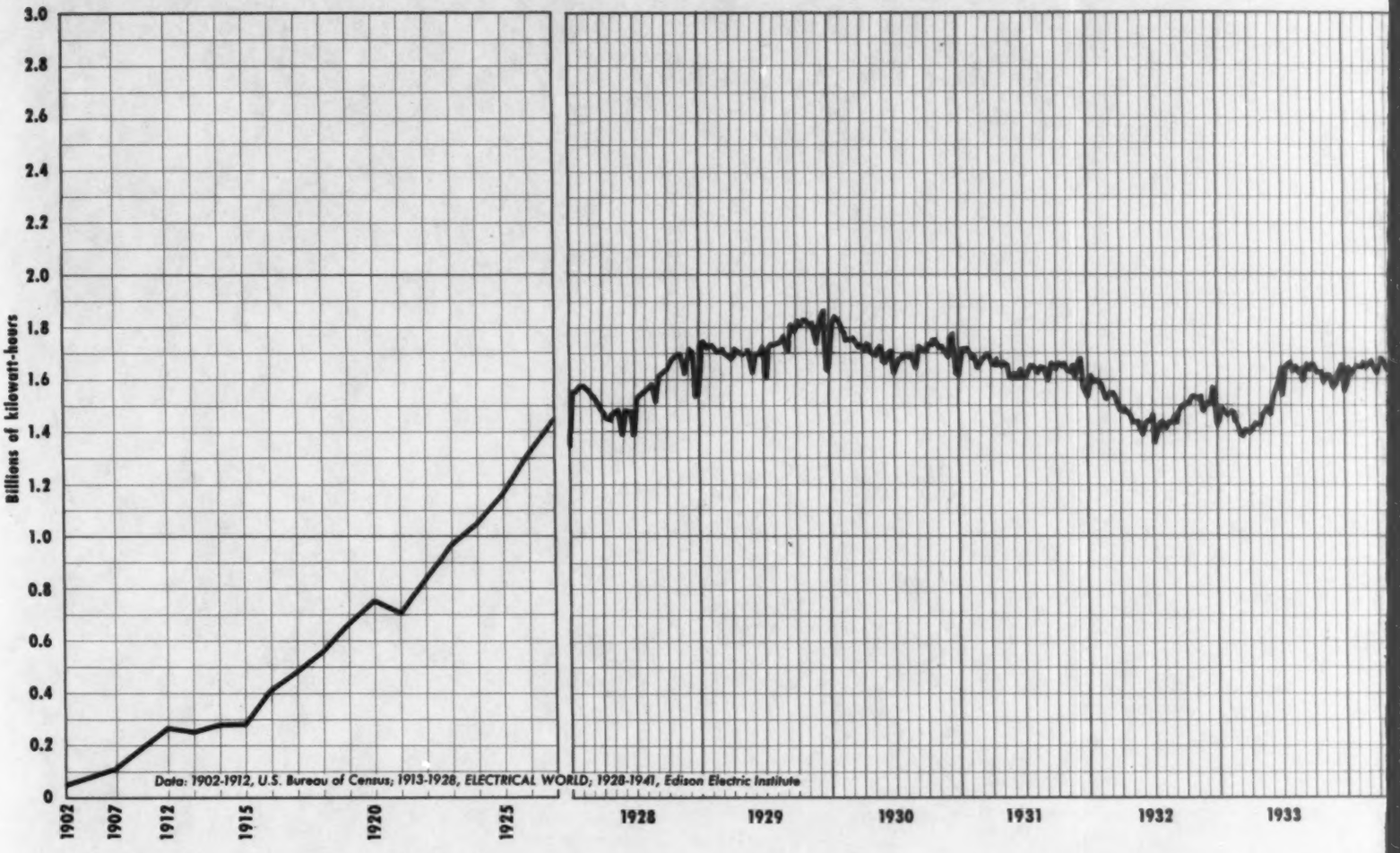

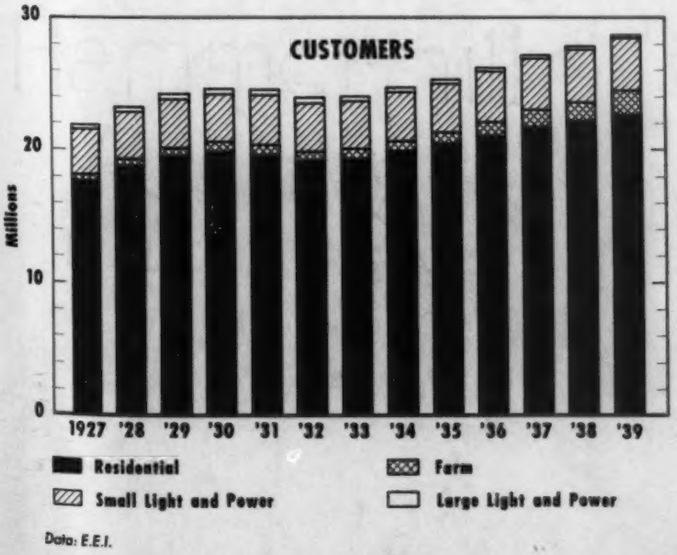

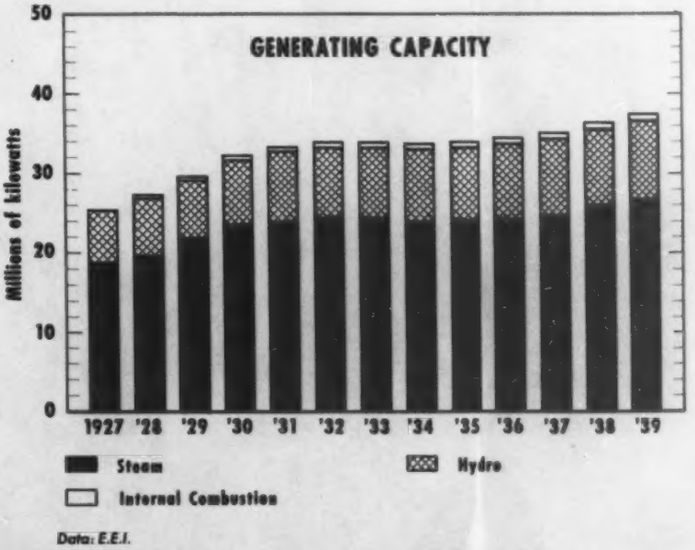

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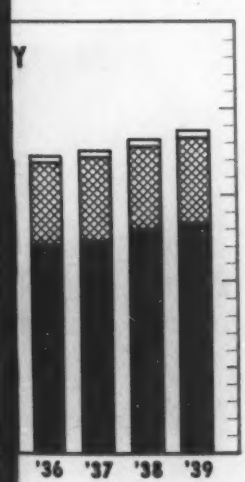

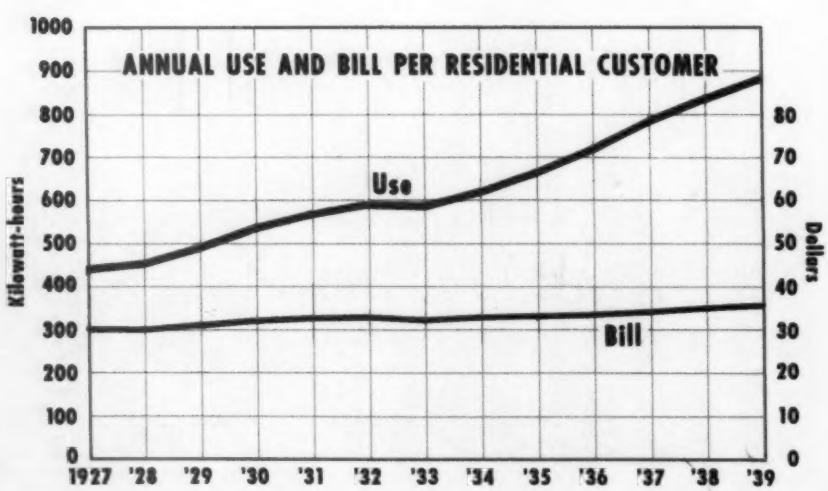

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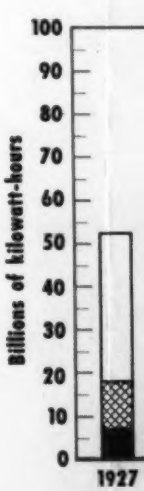

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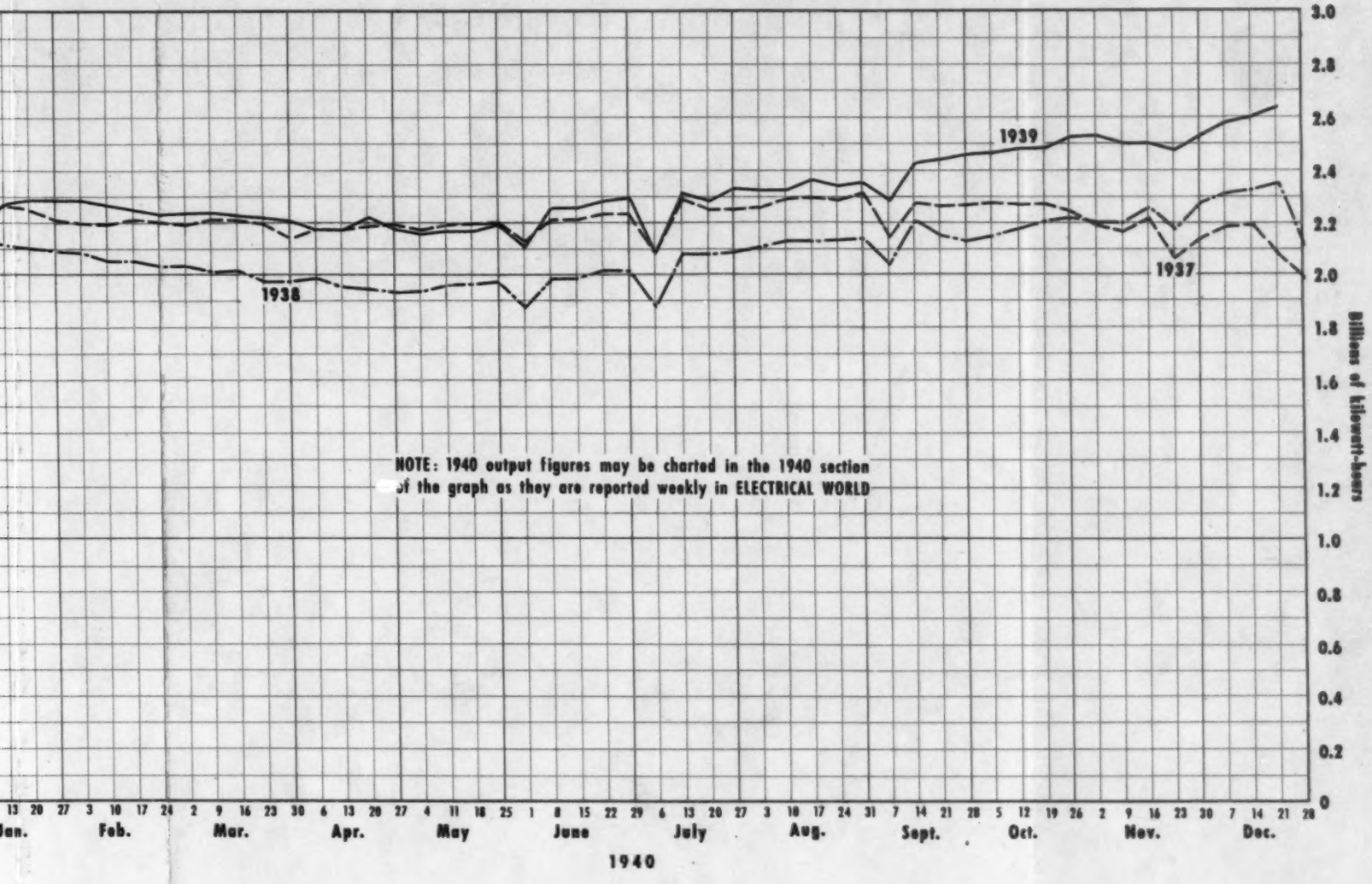

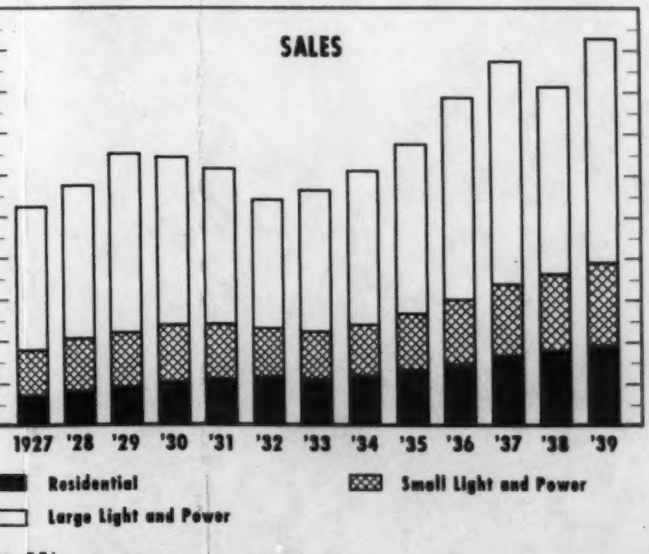

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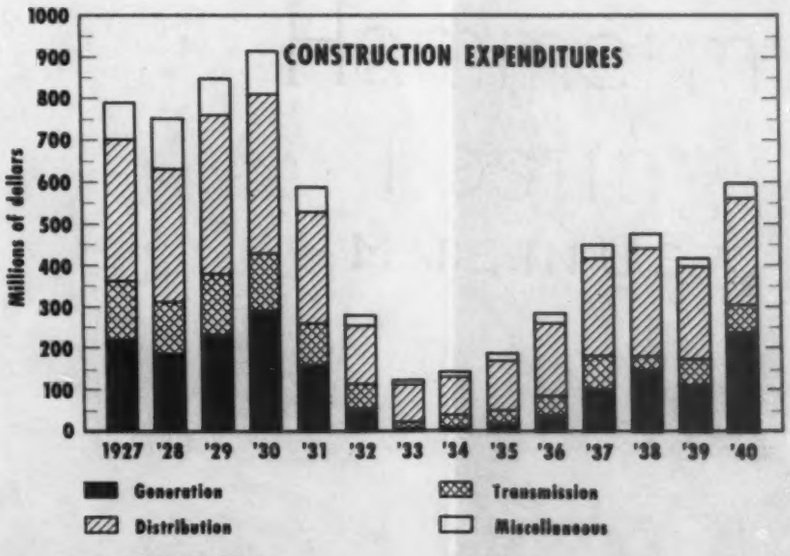

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Patent Fundamentals

By Adelbert Schapp. Published by the Industrial Press, 148 Lafayette Street, New York, N. Y. 176 pages. Price, $2.

Some books on patent law have been far too technical on the legal side to be of use, as claimed for them, to first time inventors. This one is, however, both inexpensive and practical in responding to the natural doubts and misgivings of the (equally naturally) uninformed originator of an idea that is patentable. The whole treatment is directed to the client rather than the attorney and should save many an electrical man from the errors and heartaches that fall to nine out of ten patentees. Emphasis is placed on the hope behind the drafting of claims to give commensurate protection. There are good tips on how much to conceal and reveal in the drawings. A patent is worked out in detail and proper precautions for sale and licensing are treated in simple language.

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Physik

By Dr. Paul Wessel. Published by Ernst Reinhardt, Munich. 514 pages and index. 277 illustrations. Price, 4.90 reichsmarks.

Designed as a text book for students in technical colleges and universities, this book treats physics purely as a tool, something that must be learned whether you like it or not, to pass examinations. No attempt is apparently made to interest the reader or to give any background that might have inspirational or cultural value. This makes possible terse treatment of the usual subject matter, which is available also in English. Formulas and topical heads stand out typographically.

About 70 per cent of the book is text. The feature of special interest to students preparing for examinations comes in the next 60 pages of recapitulation and 100 pages of examination questions—1,447 of them—and tables. The extensive index, 36 double-column pages, should also be most helpful.

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Radio Interference Suppression

By Gordon Wm. Ingram, B.Sc. Published by The Electrical Review, Dorset House, Stamford Street, London, S.E.I. 162 pages, illustrated. Price, 5 shillings.

Our British contemporary here offers a practical compilation of the sources of radio interference with a classification of the remedial measures. There is a helpful chart which fits the remedy to the ailment and likewise a tabulation which lists the characteristic noises generated, with useful remarks on corrective measures. The text goes into the various originating causes and the quantitative and qualitative factors involved. Meanwhile it has indicated the methods of selecting the suppressors without, however, going into much mathematical detail of design of these noise traps. The compilation of sources is quite complete for either the power or the radio engineer.

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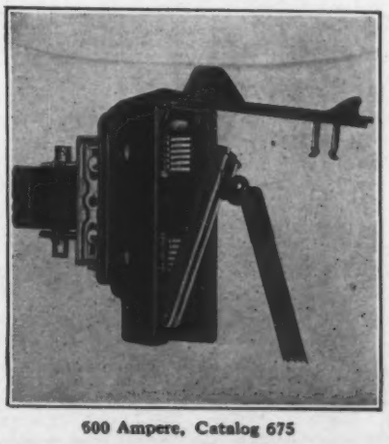

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